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DIPTERA.

VOL. III.

PIPUNCULIDÆ, SYRPHIDÆ, CONOPIDÆ, ŒSTRIDÆ.

BY

E. BRUNETTI.

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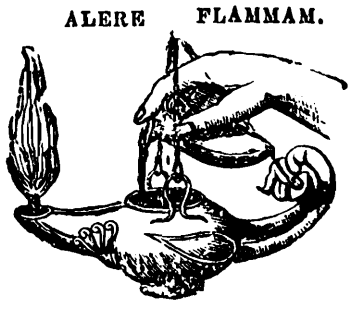

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EDITORIAL NOTE.

As stated in the Preface to Mr. Brunetti's preceding volume (Diptera Brachycera, Vol. I, May 1920), it was necessary, from want of space and for other reasons, to omit certain families from that work. The present volume is devoted to these groups, the PIPUNCULIDÆ, SYRPHIDÆ, CONOPIDÆ, and ŒSTRIDÆ. The manuscript dealing with these families was received at the same time as that of the earlier volume, but in its present form the account of them is substantially enlarged and to some extent rewritten: for, as the author explains below in his preface, several months' work at the British Museum has enabled him to include descriptions of a large number of additional species.

Like the author, the editors wish to express their indebtedness to those who have assisted in providing illustrations for the book; to Dr. N. Annandale for kindly allowing many figures to be reproduced from blocks made for 'Records of the Indian Museum'; to Mr. Bagchi, who has made a number of new figures, and to Mr. Engel Terzi for his careful drawings of CONOPIDÆ and ŒSTRIDÆ; to the Société Entomologique de France for their courtesy in permitting re-publication of the figures of *Korinchia rufa* given on pages 225–6, which recently appeared in their 'Bulletin'; and to Monsieur J. Hervé-Bazin for the loan of his original drawings of that insect.

A. E. SHIPLEY.

January 1923.

AUTHOR'S PREFACE.

THE present volume, although compiled in India, has been to a considerable extent rewritten since my return to London. Access to the British Museum collection has enabled me to include a number of additional species, to redescribe many of Walker's species, and to effect some important alterations in synonymy.

My thanks are due and are hereby tendered to Dr. N. Annandale, Director of the Zoological Survey of India, for his kind permission to reproduce many figures from the original blocks made for my papers in the 'Records of the Indian Museum.' This acknowledgment applies not only to the present volume, but also to my previous volume (Brachycera, Vol. I, 1920), from which it was omitted by an unfortunate oversight. Many new figures have been drawn by Mr. Bagchi, of the Indian Museum. Among the CONOPIDÆ and ŒSTRIDÆ text-figures 73, 74, 76, 77 and 82–85 are by Mr. A. J. Engel Terzi, of London. I am also greatly indebted to Major E. E. Austen, D.S.O., for allowing me the use of his copious manuscript notes on SYRPHIDÆ, which he made some years ago in arranging the British Museum collection, and which have proved invaluable in my revisionary work.

E. BRUNETTI.

London, May 1922.

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ERRATA AND ADDENDA.

Page

17. *Pipunculus annulifemur* should strictly not be designated "sp. nov.," as it was described by the present author in Bull. Ent. Research, xii, part 4, p. 469 (Feb. 1922). As stated there, and again in the present volume, it was described from two males, the type and another, now in the British Museum. A female was, however, figured from an example not submitted to the present author, and this figure appeared in the plate following the original description (*t. c.* pl. xv, fig. 6). This plate illustrates a paper by T. V. Subramaniam, in which *P. annulifemur* is stated to parasitise the three mango Jassids, *Idiocerus niveosparsus*, *atkinsoni*, and *clypealis*.

47. References under *Melanostoma ambiguum*: for "*Scæva ambiguum*" read "*Scæva ambigua.*" The third reference should read "*Syrphus monochætus*, Loew, Beschr. Eur. Dipt. ii, p. 224 (1871)," and the fourth should read "*Scæva hyperborea*, Holmgren, Öfvers. Vet.-Akad. Forhandl. xxix, no. 6, p. 100 (1872)."

64. Sixth reference under *Asarcina ægrota*: for "*Syrphus infirma*" read "*Syrphus infirmus.*"

76. Third reference under *Syrphus torvus*: for "*Scæva topiarius*" read "*Scæva topiaria.*"

82. References under *Syrphus balteatus*: the date under *Musca scitulus* should be 1782, not 1776. The fourth reference should read "*Musca alternata*, Schrank, Enum. Ins. Austr. p. 448 (1781)." Fifth reference: for "*Musca nectareus*" read "*Syrphus nectareus.*"

85. After the heading "**Syrphus corollæ**, *Fabr.*" add "(Pl. II, fig. 18.)."

87. The last reference under *Syrphus latifasciatus* should read "*Scæva abbreviata*, Zetterstedt, Dipt. Scand. viii, p. 3136 (1849)."

95. Line 21 from top: for "*citiofasciàtum*" read "*citrofasciatum.*"

105. Top line: for "Kertesz" read "Kertész."

196. Line 13 from bottom: for "*Magaspis*" read "*Megaspis.*"

Order DIPTERA.

Families PIPUNCULIDÆ, SYRPHIDÆ, CONOPIDÆ, ŒSTRIDÆ.

This volume is devoted to the above four families, the systematic account of which was excluded from the volume entitled "Diptera Brachycera, Vol. I," published in 1920. They are, however, referred to in the Introduction to that volume, and are included in the key of families given therein on pp. 6–9.

Family PIPUNCULIDÆ.

Head nearly globose, practically all eyes, distinctly broader than thorax, and very loosely though rather closely applied to it, generally considerably puffed out behind. Eyes bare, usually contiguous in ♂ for some distance, occasionally subcontiguous only, facets enlarged; frons in ♀ narrow, front facets enlarged, sometimes very considerably; three ocelli; face very narrow and elongate in both sexes. Proboscis very small, concealed, as are the palpi, which are said to be clavate, rarely visible. Antennæ 3-jointed; first two joints very short; 3rd more or less elongate, oval or rounded, generally (*Pipunculus*) broad at base, gradually contracting to a blunt or sharp point; or rounded (*Verrallia*, *Chalarus*); the always long, bare, basally thickened arista placed at the base of the joint. Some small ocellar and vertical bristles in *Verrallia* and *Chalarus*, but *Pipunculus* has no head-bristles.

Thorax subquadrate; bare (*Pipunculus*) or with small but distinct bristles (*Verrallia*, *Chalarus*); scutellum usually bare, rarely slightly pubescent, or with marginal bristles.

Abdomen normally cylindrical, longer than thorax, generally more or less curved, 5-segmented in ♂, 6-segmented in ♀, usually bare, but sometimes slightly or distinctly pubescent. Genitalia in ♂ large, conspicuous, affording good specific characters;* ovipositor in ♀ bulbous at base, the remainder long, pointed, and curved under the venter.

Legs moderate in length and size, bare, except for a few very short bristles beneath some of the femora in certain species; hind

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* I have not devoted much study personally to the genitalia, but according to E. T. Cresson, Junr., these organs are similar in structure though diverse in form, and are apparently variable to some extent in certain species (see Trans. Amer. Ent. Soc. xxxvi, pp. 270–1, Dec. 1910).

tibiæ generally a little twisted about the middle; tarsi with a few long hairs at tips of joints; claws rather long, pulvilli distinct, empodium hair-like.

Wings very long, in *Pipunculus* each wing generally longer than the whole body, but not unduly narrowed. Auxiliary, 1st and 2nd veins moderately long; auxiliary ending about middle of costa; 2nd ending well before wing-tip; 3rd vein simple, ending approximately at wing-tip, normally gently sinuous; anterior cross-vein before, at, or after middle of discal cell; 4th vein long, sinuous, ending a little below tip of 3rd, so that the 1st posterior cell is very broad in the middle, though narrow at both base and tip; 5th vein forked rather widely near base of discal cell, forming the lower side of it, the cell closed by the discal cross-vein; anal cell elongate, pointed at tip, closed a little before the border; anal vein reaching wing-border (*Pipunculus*) or shortened (*Chalarus*). One submarginal cell, three posterior cells (*Pipunculus*), or two only (*Chalarus*) by the fusion of the 1st and 2nd. Squamæ very small. In *Chalarus* the discal cell is absent, as the 4th vein ends shortly beyond the anterior cross-vein.

The PIPUNCULIDÆ are easily recognized by their small size, proportionately very large, almost globular head, cylindrical bare body, long wings and peculiar venation, conspicuous by the great width of the 1st posterior cell at its middle with narrow base and tip. They are obscure in colour, never really common, appearing sparingly amongst low herbage. They are exquisite hoverers*, and are closely allied to the SYRPHIDÆ and PLATYPEZIDÆ, from both of which the venation easily separates them; whilst they have affinities with the CONOPIDÆ in the cylindrical curved body, in their parasitic nature and in the venation, the only difference being in the open 1st posterior cell, which is normally closed in CONOPIDÆ as in SYRPHIDÆ.

Life-history. The larvæ, so far as known, are all internal parasites in the bodies of Homoptera. They are maggots of fairly typical cyclorrhaphous form, amphipneustic (in the final stage at least) and acephalous. The mouth-parts are very indistinct and the segments of the body indefinitely demarcated, probably 10 or 11 in number; anterior spiracles small, posterior conspicuous, near together and at some considerable distance before tip of body. Puparium short, obtusely rounded at ends, with spiracular tubercles on (?) 2nd segment, with or without other anterior minute spiracles. Emergence is effected by detachment of the dorsal plate, through which the spiracular horns project. Boheman has studied the metamorphoses of the European *Pipunculus fuscipes*, which is parasitic on *Thamnotettix* (*Cicadula*). Valuable information on the biology of certain species is given by R. C. L. Perkins (Report Exp. Station, Hawaiian Sugar Planters'

* Verrall considered them the finest hoverers in the whole of the Diptera, and asserted that he had seen them hover in the folds of a butterfly net.

Assoc., Div. Ent., Bull. I, part 4, pp. 123–157, pls. v–vii, 1905 (Honolulu)); and the life-cycle is dealt with by D. Keilin and W R. Thompson (Comptes-rendus Soc. Biol. (Paris), vol. 78, pp. 9–12, 1915).

Table of Genera.

Discal cell absent	CHALARUS, Walk., p. 3.
Discal cell present.	
Occiput puffed out; ocellar bristles absent; pubescence very slight or absent.	PIPUNCULUS, Latr., p. 4.
Occiput not prominent; ocellar bristles present; pubescence distinct	VERRALLIA, Mik., p. 21.

Genus **CHALARUS**, *Walk.*

Chalarus, Walker, Ent. Month. Mag. ii, p. 269 (1834)

GENOTYPE, *Cephalops spurius*, Fln. (Europe); by original designation.

Differing from *Pipunculus* primarily in the venation. Discal cell absent, through the 4th longitudinal vein ending suddenly just beyond the anterior cross-vein; posterior cross-vein present, situated as in *Pipunculus*; 5th vein widely forked, long; anal cell open; anal vein barely or not reaching border of wing. Second antennal joint bare, 3rd rounded at tip; two ocellar bristles present; eyes as in *Pipunculus*, front facets in ♀ enormously enlarged. Thorax with bristly hairs on side margin and round the scutellum. Abdomen pubescent in ♂; genitalia small, rounded; abdomen in ♀ more bristly, ovipositor short, incurved.

Range. Only two species are definitely known, both from Europe, *C. spurius* being also recorded from New Hampshire. I took one specimen of it at Darjiling.

1. **Chalarus spurius**, *Fln.*

Cephalops spurius, Fallen, Dipt. Suec. Syrph. p. 16 (1816).
Pipunculus spurius, Meigen, Syst. Besch. iv, p. 24, pl. xxxiii, fig. 24 (1824).
Pipunculus holosericeus, Meigen, Syst. Besch. iv, p. 24 (1824), and vii, p. 148 (1838).
Pipunculus exiguus, Haliday, Ent. Month. Mag. i, p. 162 (1833).
Pipunculus obscurus, Zetterstedt, Ins. Lapp. p. 580 (1834).
Ateleneura velutinus, Macquart, Hist. Nat. Dipt. ii, p. 12, pl. xiii, fig. 6 (1835).

♂ ♀ *Head*: eyes in ♂ nearly contiguous, front facets scarcely larger than rest in ♂, very enlarged in ♀; frons and face narrow, about equally wide, former blackish in ♂, wider in ♀, especially about the middle, with greyish side margins bearing a few tiny bristles; in both sexes with silvery-white shimmer when viewed

from above; face wholly shimmering silvery-white. Antennæ rather short, blackish; 2nd joint with rather long bristles; 3rd with silvery-white shimmer when seen from above. Ocellar bristles long, parallel, directed forwards. *Thorax* black, with bristly pubescence, which is stronger in the ♂; some bristles behind the humeri and about the sides; scutellum concolorous, with similar pubescence, and some longer bristly hairs on margin, including a long apical pair. *Abdomen* dull black in ♂, blackish-grey in ♀; of 6 distinct segments, the sides of which bear much longer bristly hairs than those on the dorsum. Genitalia of moderate size, rounded in ♂, closely incurved in ♀, with a short ovipositor, so that that sex is easily mistaken for a ♂ *Legs* dull brownish-black in ♂, sometimes more or less yellowish on trochanters, knees and tarsi in ♀ Femora with fringes of long bristly hairs; hind femora with some longer, bristly hairs in front near tip and a slight ciliation on middle of under side; tibiæ with some hairs about the middle; pubescence on legs less prominent in ♀ *Wings* tinged with black in ♂, grey in ♀; stigma long, not clearly defined; halteres blackish; squamæ small, blackish in ♂, whitish-yellow in ♀.

Length, 2½ mm.

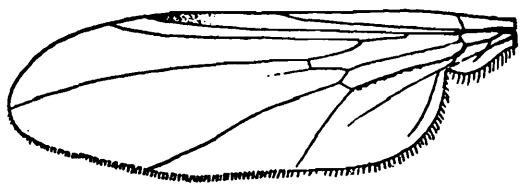

Fig. 1.—*Chalarus spurius*, Fln., wing.

This description is mainly abridged from Verrall's description of British specimens. I have only seen one Indian specimen, a ♀ not in the best condition, but almost certainly this species, from Darjiling, 7000 ft., 29. v. 1910 (*Brunetti*). The under side of the abdomen is not easily seen, but from the increased width of the frons in the middle I now assume it to be a ♀ and not a ♂ as at first recorded *.

This species occurs in many European countries, and in New Hampshire in North America.

Genus **PIPUNCULUS**, *Latr.*

Pipunculus, Latreille, Hist. Nat. Crust. Ins. iii, p. 463 (1802); xiv, p. 392 (1804).
Microcera, Meigen, Illig. Mag. ii, p. 273 (1803).
Cephalops, Fallen, Specim. entom. p. 10 (1810).
Prothechus, Rondani, Dipt. Ital. Prod. i, p. 139 (1856).
Alloneura, Rondani, Dipt. Ital. Prod. i, p. 140 (1856).

GENOTYPE, *Pipunculus campestris*, Latr.; by original designation.

Head nearly globose, practically all eyes (in profile only the antennæ being visible), except for the considerably puffed-out

* Brun., Rec. Ind. Mus. vii, p. 495 (1912).

occiput; frons and face very narrow, generally linear; the extremely large eyes normally contiguous in ♂ for a considerable distance, but sometimes for a short distance only or even very narrowly separated; always separated in ♀ by a comparatively narrow frons; all facets large, those in front still larger in ♂ and in the ♀ sometimes larger still. Antennæ moderately long, 3-jointed; 1st joint very short; 2nd rather short, irregularly cup-shaped; 3rd more or less pointed or beak-shaped, especially in ♀; arista long, with a basal joint, bare, thickened at base. *Thorax* subquadrate, rarely slightly pubescent, occasionally with a few distinct bristles; scutellum generally with microscopic marginal bristles. *Abdomen* normally cylindrical, about as long as thorax, curving downwards more or less, 5-segmented, apart from the genital organs; hypopygium of male large, exposed; ovipositor of ♀ long and pointed, curved under the venter. *Legs* simple, but offering good specific distinctions, generally bare, except for some microscopic bristles on apical half of under side of some of the femora, and also some pubescence or ciliations behind the femora. *Wings* with characteristic venation: auxiliary, 1st and 2nd longitudinal veins long, ending between middle of costa and well before wing-tip; 3rd vein simple, curving markedly upwards about its middle and ending at wing-tip; 4th vein simple, curving markedly downwards near end of discal cell and then rapidly upwards again, so that the 1st posterior cell is very broad in the middle, though quite narrow at base and narrowly open at the tip; anterior cross-vein before, at, or beyond middle of discal cell, offering good characters for separating the species into groups; 5th vein forked, forming the whole hinder side of the discal cell, which is closed by the discal cross-vein; posterior cross-vein present, short, near base of discal cell, the lower branch closing anal cell, which is always elongate, pointed at tip, reaching nearly to wing-border. Alulæ and squamæ very small.

Range. World-wide.

Pipunculus is a genus of small dark flies, generally bare or with but slight pubescence or small bristles except for the microscopic ones below the femora. They are usually black, but often with parts of the legs, or, more rarely, bands or markings on the abdomen, pale. The species fall into several groups, characterized by differences in venation, form of antennæ, and the structure of the legs and genitalia.

Life-history: see under description of the family.

Table of Species.*

1.	Stigma present, even if weak	2.
	Stigma entirely absent	17.
2.	Fourth longitudinal vein with a distinct appendix.	*appendiculatus*, Brun., [p. 7
	Fourth longitudinal vein without trace of an appendix.	3.
3.	Femora generally mainly black	4.
	Femora wholly yellow	13.

* For table of Oriental species see Brun., Rec. Ind. Mus. vii, p. 484.

4.	Abdomen all black, blackish-grey, or æneous; in no part yellow	5. [p. 8.
	Abdomen with basal half yellow.	*flavocinctus*, Brun.,
5.	Tibiæ wholly yellow	*biroi*, Kert., p. 9.
	Tibiæ black, except (at most) base and tip *	6.
6.	Middle femora with ciliation on hinder side	7.
	Middle femora without trace of ciliation; hind femora always brilliantly shining black on inner side	9.
7.	Anterior cross-vein just before middle of discal cell	*brevis*, Brun., p. 7.
	Anterior cross-vein at about one-third the length of the discal cell	8.
8.	Larger species, 4 mm.	*major*, sp. n., p. 10.
	Smaller species, $2\frac{3}{4}$ mm.	*campestris*, Latr., var. *himalayensis*, Brun., [p. 11.
9.	Abdomen distinctly but not brilliantly æneous	*subæneus*, sp. n., p. 12.
	Abdomen never æneous, more or less shining black or greyish	10.
10.	Femora black to tips.	*extensus*, sp. n., p. 13.
	Femora always pale at tips	11.
11.	Genitalia in ♂ distinctly less broad than last abdominal segment; 5th segment distinctly longer than 4th	[p. 13. *transversus*, sp. n.,
	Genitalia in ♂ practically or quite as broad as last abdominal segment; 5th segment barely longer than 4th . .	12.
12.	Abdomen nearly bluish-grey, with whitish parts	*chalybeus*, sp. n., p. 15.
	Abdomen uniformly cinereous-brown.	*uniformis*, Brun., [p. 14.
13.	Abdomen with 2nd, 3rd and 4th segments yellow	*filicornis*, Brun., p. 15.
	Abdomen without yellow marks. ...	14.
14.	Abdomen mainly or wholly shining black..	15.
	Abdomen blackish-grey or ash-grey (ground-colour) ... ... :	16. [p. 17.
15.	Femora with broad black median ring	*annulifemur*, sp. n.,
	Femora without such ring ..	*nigronitens*, Brun., [p. 17.
16.	Antennæ wholly bright yellow; coxæ brown; 4th vein nearly straight beyond posterior cross-vein; length 4 mm.	*cinereo-æneus*, Brun., [p. 16.
	Antennæ with first two joints black, 3rd yellow; coxæ yellow; 4th vein normally curved; length $2\frac{1}{2}$ mm.	*luteipes*, sp. n., p. 18.
17	Anterior cross-vein distinctly before middle of discal cell	18.
	Anterior cross-vein almost exactly at middle of discal cell	19.
18.	Anterior cross-vein placed at second fourth of discal cell; abdomen light grey with distinct pubescence, and a large brown spot on 2nd segment; pulvilli and claws remarkably developed	*mirabilis*, Brun., p. 19.

* In *P. chalybeus* the tibiæ are dull orange, except the posterior pair, which are mainly blue-grey.

	Anterior cross-vein placed at almost exactly one-fourth of the discal cell; abdomen black, bare, without a conspicuous spot; pulvilli and claws normal	[p. 19. *quartarius*, Brun.,
19.	Abdomen greenish.	*limpidipennis*, Brun., p. 20.
	Abdomen shining bluish-black	*nitens*, Brun., p. 21.

2. Pipunculus brevis, *Brun.*

Pipunculus brevis, Brunetti, Rec. Ind. Mus. vii, p. 491 (1912).

♀. *Head* with frons moderately wide, of uniform width up to the vertex, blackish seen from in front, silver-grey seen from above; face similar; antennæ brown, arista black; back of head blackish-grey, only moderately puffed out behind. *Thorax* almost uniformly blackish-grey, ash-grey at sides; humeri small, brown; scutellum dark brown, bare, except for a few hairs on posterior border; metanotum ash-grey. *Abdomen* blackish-grey, shortened; sides of segments, and almost the whole of segments one and two grey tinged, which colour goes over the sides to the venter. The abdomen appears discoloured, and probably in its natural state it is wholly dark grey. The last segment bears a long shining brown horny process which reaches under the venter almost to the base of the abdomen, and is turned slightly to the left. *Legs* blackish-brown; knees and base of tibiæ light yellowish-brown; middle femora ciliated. *Wings* very pale grey, nearly clear; stigma brown; anterior cross-vein placed rather after two-fifths of the distance from base of discal cell, but distinctly before its middle; 4th costal segment very shortened, not half as long as 3rd, 3rd and 4th together about equal to the 5th; the 4th longitudinal vein, after quitting the posterior cross-vein, takes an outward curve before proceeding to the wing-border; halteres brown.

Length, 3½ mm., without ovipositor.

Described from 1 ♀ in the Indian Museum from Mergui, Lower Burma.

3. Pipunculus appendiculatus, *Brun.*

Pipunculus appendiculatus, Brunetti, Rec. Ind. Mus. vii, p. 485 (1912).

♀ *Head* (wanting). *Thorax* bluish-grey, with light brown reflections, but with no distinct marks; humeri distinct, rather large, brownish; sides of thorax dark bluish-grey, with whitish reflections when seen from behind; scutellum bluish-grey, tinged with pale brown; metanotum bluish-grey with whitish reflections. *Abdomen* bluish ash-grey; rather more than the basal half of each segment rich velvet-black, which extends hindwards in the centre until it nearly meets the next segment; these black bands extend over the sides and right across the ventral surface so that the venter is practically a replica of the dorsum. Last segment (6th)

all bluish-grey, bent under the venter and carrying a moderately long reddish-brown shining process bearing a bunch of hairs near the tip. *Legs* dark blackish-brown; extreme base and tips of femora pale yellowish-brown; tibiæ blackish-brown, with bases rather broadly, and tips rather narrowly yellowish-brown; tarsi dark brown above, light brown below; femora with silvery-white shimmer, when seen in certain lights. Legs microscopically pubescent; no ciliation behind middle femora; hind femora not shining on inner side. *Wings* distinctly pale brown; second costal segment quite clear and transparent; third twice as long as the fourth, the stigma distinct, but ill-defined on inner side; 4th longitudinal vein curved outwards in a bow after quitting the posterior cross-vein and possessing an appendix, commencing as far from the junction of the 4th longitudinal with the posterior cross-vein as the length of that cross-vein, and extending more than half-way to the wing-border; anterior cross-vein exactly over centre of discal cell. Basal part of wing rather clear, but extreme base pale yellowish; halteres brownish-yellow.

Length, 3 mm. (excl. head and ovipositor),

Described from a single ♀ in the Indian Museum from Margherita, Assam.

I would not have described as new a decapitated specimen, but for the strikingly distinctive characters of this species, in which the furcation of the 4th longitudinal vein makes it impossible for it to be confounded with any other Oriental species except *amboinalis*, Walk.

This species must be near *furcatus*, Egg., occurring in Europe, but that species has wholly yellowish tibiæ and tarsi.

Walker's species *amboinalis* would be almost unrecognizable from the brief description, except for the appendiculation of the "præbrachial" vein (4th longitudinal), a character which I do not know to occur in any other eastern species but these two. Herr Kertész does not mention this character in his notes on *amboinalis* (Ann. Mus. Hung. i, p. 470), founded on an examination of Walker's type by Miss Ricardo, but I presume he would have called attention to the fact had Walker's description been in error.

P. appendiculatus is therefore distinguished by the mainly black legs and the slightly different (but, I should think, consistent) coloration of the abdomen. The latter might equally well be described as black, with grey posterior borders to the segments (interrupted in the middle), this colour being continued over the sides and across the venter.

4. Pipunculus flavocinctus, *Brun.*

Pipunculus flavocinctus, Brunetti, Rec. Ind. Mus. vii, p. 488 (1912).

♂ *Head* with eyes contiguous for a considerable distance; back of head, frons and face wholly black; antennæ with 1st and

2nd joints black, 3rd brownish-yellow, whitish towards tip when seen from above; proboscis slightly brownish-yellow; occiput moderately puffed out. *Thorax* black, mainly dull, bare, but dorsum a little shining; sides inclined towards blackish-grey; scutellum and metanotum apparently concolorous. *Abdomen* black, barely shining; posterior margin of 1st segment, the whole of the 2nd, 3rd and 4th, and towards the sides of the 5th segment brownish-yellow, the colour extending over the sides across the venter; genitalia black. *Legs* yellow; coxæ (except tips), femora (except broadly at base and narrowly at tips) black; middle femora with ciliation of hairs behind; hind femora shining on inner side on the black part. *Wings* clear, 3rd costal segment brown, the colour filling the apical three-fourths, 3rd segment about equal to the 4th in length, and much shorter than the 2nd; anterior cross-vein just before middle of discal cell; 4th longitudinal vein gently angled after quitting discal cell; anal cell ending at a moderate distance before the margin; halteres pale yellow.

Length, $2\frac{1}{2}$ mm.

Described from a type-specimen in the Indian Museum taken by Dr. Annandale at Kurseong, Darjiling District, 28. vi. 1910.

The *type* is now in very bad condition, and of the legs only one remains.

A second specimen in the same collection appears to be a variety of this species, the differences consisting in the antennæ being all black; a greater contrast between the scutellum and metanotum, the former being shining black, bare, the latter distinctly grey; and the presence of a wide dorsal black band, connecting the basal and apical black parts, although the yellow colour extends over the sides and across the venter, as in the type. The legs and wings are identical, except that the third costal segment is relatively a little longer. Size identical. One specimen, a male, taken by Mr. C. W Beebe, at Tonglu, Darjiling District, 10,000 ft., 22. iv. 1910.

5. Pipunculus biroi, *Kert.*

Pipunculus biroi, Kertész, Ann. Mus. Hung. i, p. 466 (1903); Brunetti, Rec. Ind. Mus. vii, p. 487 (1912).

♂ ♀ *Head* in ♂ with eyes contiguous for a considerable space; frons brownish, grey-dusted, with an elongate black streak just below the middle, and, viewed from above, with a white shimmer immediately above the antennæ; face brilliantly shining white; antennæ rather small, first two joints blackish, the 2nd with a few bristles, 3rd joint yellowish-grey, with a white shimmer when viewed from above; the long arista black; proboscis and mouth-parts orange; occiput considerably puffed out, brownish-grey, with a white shimmer in certain lights. In ♀, frons with parallel sides, grey-dusted, shining white just above antennæ; the front eye-facets enormously enlarged. *Thorax* olive-grey;

shoulders, side margins and hind margin, also the pleuræ and metanotum wholly, ash-grey; scutellum brownish-grey. *Abdomen* dark ash-grey; a broad dark olive-brown basal band, narrowing at the sides, on each segment, extending in the centre nearly or quite to the next segment; base of abdomen more or less greyish; venter mainly dark grey. Genitalia in ♂ blackish, shining, of moderate size; in ♀ blackish, with a long reddish-brown ovipositor. *Legs*: coxæ greyish; femora rather darker grey; trochanters, tips of all femora and base also of hind pair, orange; inner sides of hind femora wholly shining black; tibiae and tarsi orange, tips of latter blackish. *Wings* pale grey, stigma brownish, rather long; anterior cross-vein barely before middle of discal cell; halteres yellow.

Length, 3 mm.

Redescribed from a number of specimens of both sexes; apparently a widely distributed species; type described from Colombo, 28. ii. 1902.

Darjiling, 29. ix. 1908 (*Brunetti*); Allahabad, 29. x. 1906 (*Howlett*); Calcutta, not uncommon, 2. x.–22. xi. 1907; Port Canning, 6. xii. 1907; Paresnath, W Bengal, 4500 ft., 11. iv. 1909 (*Annandale*); Bhagalpur, Bengal, 16. ii. 1910 (*Chaudhuri*); Puri, 18–19. i. 1908 (*Annandale*); Pusa, 7 i. 1914, 24. iv. 1913, 30. iv. 1914, 10. xii. 1912; Mangaldai District, Assam–Bhutan Frontier, 2. i. 1911 (*Kemp*); Rangoon, 23. xii. 1904–3. i. 1905 (*Brunetti*).

6. **Pipunculus major**, sp. nov. (Pl. I, fig. 1.)

♂ ♀ *Head* with eyes touching in ♂ for less than half the distance from the rather large elongate vertex to the antennæ; frons and face silvery-white when seen from above; antennae light brown, with a little white shimmer when seen from above, arista black; back of head only moderately puffed out, greyish round margin. Frons in ♀ as wide as face. *Thorax* dull blackish, with traces of a thin cinereous-brown covering of tomentum; a little greyish about the shoulders; sides and pleuræ more or less ash-grey; scutellum dull black; metanotum ash-grey. *Abdomen* in ♂ with 1st segment ash-grey, dirty black at base; 2nd, 3rd and 4th segments dark slate-grey, with a shining black basal band filling about half the segment and extending to the sides, which latter are ash-grey, except at the base of each; 5th segment nearly twice as long as 4th, mainly light grey or ash-grey, broadly black at base; genitalia very small, mainly concealed. In ♀, light grey, nearly ash-grey; 1st segment as in ♂; 2nd, 3rd and 4th with a narrow ill-defined black basal band; 5th segment not much longer than 4th; basal segment of genitalia appearing like a 6th abdominal segment and of the same coloration. *Legs* black, tips of femora rather broadly, base and tips of tibiæ very broadly, orange; middle tarsi orange, except the last joint, which is black; fore and hind tarsi brown on basal half, black on apical

half. All femora with minute bristles on apical half of under side; inner side of hind femora very shining black; middle femora with a ciliation of hairs on hinder side. *Wings* clear, iridescent; stigma pale brown, rather weak; anterior cross-vein more nearly at one-third than middle of discal cell; halteres brownish.

Length, 4 mm.

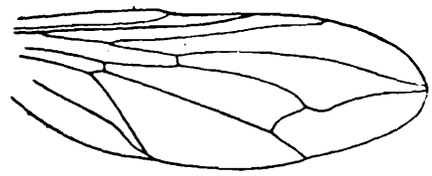

Fig. 2.—*Pipunculus major*, Brun., wing.

Described from 3 ♂ ♂ and 2 ♀ ♀ in the Pusa collection from Pusa, Bengal, 20. iii. 1913 (*type* ♂), 7 xi. 1912 (*type* ♀), 7. i. 1913, 7 iv. 1913.

Types sent to the British Museum.

7. **Pipunculus campestris**, *Latr.*, var. **himalayensis**, *Brun.*

Pipunculus campestris, Latr., var. *himalayensis*, Brunetti, Rec. Ind. Mus. vii, p. 487 (1912).

♂. *Head*: frons blackish-grey, with a little grey shimmer above the antennæ; vertex shining black; antennæ black, somewhat short, 3rd joint with a grey shimmer; arista only twice as long as the antennæ; eyes contiguous for a considerable distance, facets almost uniform in size; back of head dark grey, occiput rather well puffed out. *Thorax* blackish, sides lighter; scutellum shining blackish; metanotum with silvery-grey tinge. *Abdomen* blackish, greyish towards the sides, the colour with a tendency to extend a little along the margins of the segments; hypopygium black, short, wide, with a distinct depression in centre. *Legs* black, dull; femora brownish-yellow at base and tip, with some traces of a greyish shimmer; basal half of tibiæ and under side of part of tarsi brownish-yellow; middle femora with ciliation of hairs on hinder side. *Wings* clear; stigma pale brown; 3rd costal segment a little longer than the 4th; anterior cross-vein at about one-third of the discal cell; 4th longitudinal vein slightly curved after quitting the posterior cross-vein; halteres black.

Length, $2\frac{3}{4}$ mm.

Described from two ♂ ♂ in the Indian Museum, taken by me at Darjiling, 29. v. 1910 (*type*) and 29. ix. 1908.

These two specimens vary so little from typical *P. campestris*, which is one of the commonest European species, having a wide distribution and therefore likely to occur in the Himalayas, that it seems impossible to regard them as other than a variety. The length of the arista being only twice instead of thrice the

length of the antenna, the absence of any shining black segment in the abdomen, and the almost bare thorax are the only differences.

The frons is about one-tenth the width of the head (measured immediately above the antennæ), as is shown in Verrall's figure *, and as is the case in the European specimens before me. Mr. Verrall, however, says in the text that the frons is only one-twentieth the width of the head.

This species in typically marked specimens is easily distinguished from *biroi* by the black apical half of the tibiæ, and from my *cinereo-æneus* by its black antennæ and halteres, and the mainly black legs. However, three specimens in the Indian Museum appear to show an intermediate form which may possibly be a third species. The antennæ are white-tipped, the body colour dark grey, the abdomen quite similar to that of *biroi*, but the tibiæ show the black apical half in two specimens and distinct traces of them in the third, which would associate the form with the variety *himalayensis*. The greyish thorax and abdomen and distinctly whitish-tipped antennæ seem to prevent them being any form of *campestris*. Moreover, in one of the two males (the third, the Sahelwa specimen, is a ♀) the tip of the antennæ is produced into a long bristle as in my *filicornis*. They show the following data: Simla, 9. v. 1909; Theog, Simla Hills, 13. v. 1909 (both *Annandale*); Sahelwa, Bahraich District, United Provinces, 11. iii. 1909.

8. **Pipunculus subæneus**, sp. nov. (Pl. I, fig. 2.)

♂. *Head* very slightly puffed out behind; eyes contiguous for a long distance; vertex very small; frons grey-dusted, showing a shining black stripe in the middle; face blackish. Antennæ blackish; 3rd joint brownish, with grey tomentum, rather blunt at tip; arista black. *Thorax* and scutellum dull æneous, with microscopic brownish tomentum; pleuræ dull æneous-brown.

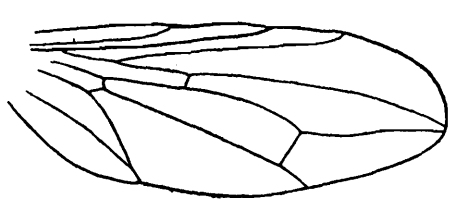

Fig. 3.—*Pipunculus subæneus*, Brun., sp. n., wing.

Abdomen æneous, with a cinereous tinge in certain lights; genitalia less shining, nearly as broad as last segment. *Legs* mainly black; hind femora shining black on inner sides; tips of femora, base and tips of tibiæ and the tarsi orange; latter darker towards tips. *Wings* clear; stigma brownish; anterior cross-vein a little

* 'British Flies,' viii, p. 99.

before middle of discal cell; halteres: stems yellowish, clubs blackish.

Length, 2⅓ mm.

Described from a single ♂, Khasi Hills, 1000–3000 ft., iii. 1907 *Type* sent to the British Museum from the Pusa collection.

9. **Pipunculus transversus**, sp. nov. (Pl. I, fig. 3.)

♂ *Head* with eyes touching for half the distance from vertex to antennæ; frons blackish, with greyish tomentum on lower part; face silvery-white when seen from above; antennæ yellowish, with grey tomentum, 3rd joint moderately pointed; occiput light grey, moderately puffed out. *Thorax* and scutellum dull blackish-æneous, covered with cinereous-grey tomentum; pleuræ rather light grey. *Abdomen* dark olive-brown, nearly black, grey on hinder part of segments towards sides, also very narrowly on hind margins; 5th segment nearly twice as long as 4th, light grey, but darker at base, the segment considerably narrower at tip than at

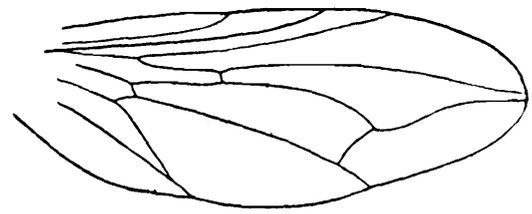

Fig. 4.—*Pipunculus transversus*, Brun., sp. n., wing.

base; genitalia cinereous-grey, less broad than hind part of 5th segment. *Legs* mainly black; femora broadly orange at tip; tibiæ orange with a broad rather irregular median black ring occupying the greater part of the surface; fore tarsi mainly orange, posterior tarsi blackish with tips of segments very narrowly orange; inner sides of hind femora shining black; no ciliation behind middle femora. *Wings* clear; stigma brown; anterior cross-vein at or just beyond one-third of the discal cell; halteres dirty yellow.

Length, 3½ mm.

Described from 2 ♂ ♂ in the Pusa collection from Pusa, 30. iv. 1914 (*type*) and 19. iii. 1914.

Type sent to the British Museum.

10. **Pipunculus extensus**, sp. nov.

♂ ♀. *Head* in ♂ with eyes contiguous for a moderately long distance, vertex very small; frons and face silvery white when seen from above, an indistinct median black ground-colour stripe on the former; antennæ dark, 3rd joint whitish grey-dusted, arista shining black; occiput a little puffed out behind. In ♀, frons as wide as face; 3rd antennal joint rather longer, more pointed, the tip slightly turned up; front facets of eyes

enormously enlarged. *Thorax* and scutellum cinereous; pleuræ nearly slate-grey; metanotum ash-grey. *Abdomen* ash-grey, with a transverse blackish band on base of each segment reaching to the sides, widened in the centre, but not sufficiently to reach the next segment; sides of abdomen curving considerably under the blackish venter; genitalia rather small. *Legs* all black, except base of tibiæ which is dull orange; brownish-yellow pubescence below

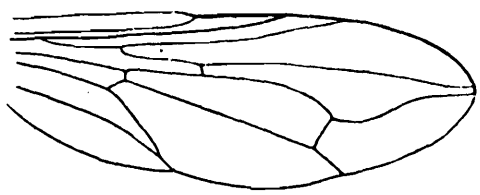

Fig. 5.—*Pipunculus extensus*, Brun., sp. n., wing.

hind tarsi; inner sides of hind femora shining black; no ciliation behind middle femora. *Wings* nearly clear; stigma very pale and indistinct; anterior cross-vein more nearly at one-third than at the middle of the discal cell; halteres black.

Length, 3–3½ mm.

Described from a pair taken "*in cop.* while hovering motionless in the air, Pusa," 28. iii. 1912 *(Howlett)*.

Types sent to the British Museum.

11. **Pipunculus uniformis**, *Brun.* (Pl. I, fig. 5.)

Pipunculus uniformis, Brunetti, Rec. Ind. Mus. xiii, p. 82 (1915).

♂. *Head* with eyes contiguous for about half the distance from the moderately large vertex to the antennæ; frons and face brownish, silvery-white when seen from above; antennæ brown, 3rd joint, at least at the narrowed and lengthened tip, with white pubescence; arista black; occiput moderately puffed out, blackish-grey. *Thorax* rather dark cinereous-brown; sides dull; metanotum grey. *Abdomen* rather dark cinereous-brown; 1st segment a

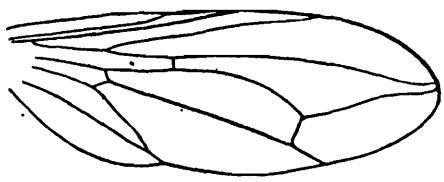

Fig. 6.—*Pipunculus uniformis*, Brun., wing.

little greyish on hind corners; 5th segment barely longer than 4th; genitalia concolorous above, large, blacker and shining below, as broad as last segment. *Legs* mainly black; tips of femora brownish-yellow; base and tips of tibiæ brownish-yellow, apparently to an irregular extent; tarsi more or less brownish-yellow, darker towards tips; hind femora shining black on inner

side. *Wings* clear; stigma weak, brownish; anterior cross-vein at about one-third of the discal cell; halteres dirty yellow.

Length, nearly $2\frac{1}{2}$ mm.

Described from a unique ♂ from Simla, x. 1908 (*Howlett*).

Type sent from the Pusa collection to the British Museum.

12. **Pipunculus chalybeus**, sp. nov. (Pl. I, fig. 4.)

♂ *Head* with vertex shining black; eyes contiguous for a considerable distance: frons and face brilliantly shining white; antennæ black, 3rd joint yellowish, shining white when viewed from above; proboscis with very large orange labella; palpi dark brown; occiput very slightly puffed out, upper part flush with vertex. *Thorax* (dorsum and scutellum damaged) apparently dark grey; metanotum and pleuræ ash-grey. *Abdomen* dark grey, almost blackish, with a bluish tinge and traces of grey dust towards the sides; 1st segment black at base, hinder half ash-grey; 5th segment no longer than 4th, lightly grey-dusted. Genitalia very large, wider than last segment, shining dark brown.

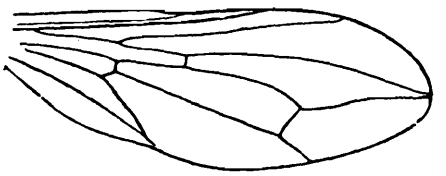

Fig. 7.—*Pipunculus chalybeus*, Brun., sp. n., wing.

Legs: coxæ ash-grey; femora darker grey, tips orange; fore tibiæ dull orange; posterior ones bluish-grey except at base and tips; tarsi orange, tips dark. *Wings* pale grey; stigma brownish; anterior cross-vein distinctly before middle of discal cell; halteres dirty brownish-yellow.

Length, $2\frac{1}{4}$ mm.

Described from a single ♂ in slightly damaged condition, from Cherambadi, Wynaad, x. 1913 (*Howlett*).

Type presented by Mr. T. B. Fletcher to the British Museum.

Since being described the type has been accidentally further injured.

A specimen in the Pusa collection from *Poinsettia*, Cherambadi, Wynaad, x. 1913 (*Howlett*), may be of the same species. It is distinctly larger and the body, especially the abdomen, is very distinctly bluish.

13. **Pipunculus filicornis**, *Brun.*

Pipunculus filicornis, Brunetti, Rec. Ind. Mus. vii, p. 489 (1912).

♀. *Head* with frons and face very narrow, still narrower at the level of the antennæ, almost wholly with a greyish-white reflection.

Antennæ bright yellow; 3rd joint very elongate, pointed, and the tip bearing a long straight black bristle; arista thickened considerably at the yellow base, thence black and long, thus giving the appearance of the antennæ bearing two aristas, one pointing upwards and one downwards. Facets of eyes immediately in front very greatly enlarged; back of head very slightly puffed out, grey, with a narrow fringe of pale hairs. *Thorax* dark æneous-black, moderately shining, with microscopic pale pubescence; humeral calli yellowish grey-dusted, rather more prominent than usual in this genus; sides dirty yellowish; scutellum livid yellow, microscopically grey-dusted; metanotum dark grey. *Abdomen* pale yellow, microscopically pale-haired, with a black, rather wide, dorsal stripe on the 2nd, 3rd and 4th segments, which has a tendency to form a narrow transverse line at the bases of these segments; 5th and 6th segments wholly black, posterior corners of former slightly yellowish; venter dirty yellow, blackish towards tip. Genitalia large, blackish, globular, shining, with a long shining brown ovipositor bent under the venter. *Legs* practically entirely yellow; coxæ brownish on basal half; tibiæ and tarsi microscopically beset with black bristles, on the former longitudinally, on the latter transversely; claws long, pale yellow, black-tipped; pulvilli apparently large, strong and reddish-yellow; no ciliation behind middle femora; inner sides of hind femora not shining black. (The apical parts of most of the legs are damaged.) *Wings* clear; stigma pale yellow, stigmatic segment barely longer than 4th costal segment; anterior cross-vein at two-fifths of the discal cell; 4th longitudinal well curved.

Length, 4 mm.

Described from one specimen in the Indian Museum from Kurseong, 5000 ft., 5. vii. 1908 (*Annandale*).

A striking and abnormal species, the yellow abdomen and filiform 3rd antennal joint characterizing it sufficiently to ensure immediate recognition. The feet seem to be peculiarly constructed, but are too damaged to define accurately, the specimen being otherwise in good condition.

14. **Pipunculus cinereo-æneus**, *Brun.*

Pipunculus cinereo-æneus, Brunetti, Rec. Ind. Mus. vii, p. 490 (1912).

♀ *Head* with front narrowed towards vertex until the eyes nearly touch; frons and face silver-grey when seen from above; antennæ bright yellow; eye-facets distinctly larger in the vicinity of the facial groove; (back of head too damaged to describe). *Thorax* (somewhat damaged) blackish-grey; sides light ash-grey, with concolorous pleuræ and metanotum; scutellum æneous-brown, with some pale hairs on posterior border. *Abdomen* blackish-grey; the posterior borders of the segments rather narrowly ash-grey; the colour widened at the sides and carried over to the under side; 6th segment bearing a large conical ash-grey process,

ferruginous-brown at tip, from which projects a brown pointed shining horny ovipositor, which is curled under the venter, its tip reaching the middle of the 3rd segment. *Legs* brownish-yellow; coxæ brown; upper side of tips of tarsi blackish. No ciliation behind middle femora; hind femora not shining on inner side. *Wings* almost clear, stigma pale brown; anterior cross-vein placed at one-third from the base of the discal cell; 4th longitudinal vein running almost straight to the wing-tip after leaving the posterior cross-vein; halteres pale yellow.

Length, 4 mm., without ovipositor.

Described from one ♀ in the Indian Museum from Mergui, Lower Burma.

15. **Pipunculus annulifemur**, sp. nov.

♂ *Head*: eyes dark red; vertical triangle black, frons dull black, lower part with a somewhat quadrate greyish dust-spot; face dull black, lower half appearing grey when viewed from above. Antennæ dull yellowish; 3rd joint distinctly pointed, moderately long and almost sub-triangular. Occiput moderately produced behind eye-margins, black, with a little grey dust. *Thorax* moderately shining black, middle of dorsum with yellowish-brown dust and a little pale pubescence; pleuræ blackish with some greyish dust. *Abdomen* shining black; a very little yellowish pubescence towards sides; genitalia with a yellowish tinge. *Legs* mainly yellow; coxæ black, also a broad median band on femora (possibly incomplete in individuals); tarsi darker towards tips. All the femora slightly shining and with a row of very small bristles on about the apical half of the under side. *Wings* clear; stigma very pale yellow; anterior cross-vein at about two-fifths of the discal cell; halteres yellowish.

Length, $2\frac{1}{2}$–$3\frac{1}{2}$ mm.

Described from 2 ♂ ♂ in the British Museum, presented by the Bureau of Entomology.

Bangalore, Mysore State, South India, about 3000 ft.

16. **Pipunculus nigronitens**, *Brun.*

Pipunculus nigronitens, Brunetti, Rec. Ind. Mus. vii, p. 490 (1912).

♂. *Head* with vertex shining black, slightly elongated; frons and face blackish, but if viewed from above the former appears greyish with a slight bluish tinge, and the latter nearly snow-white; occiput slightly puffed out behind; antennæ wholly black but seen from above the tip of the 2nd joint and the apical part of the 3rd are more or less grey-dusted; arista black, thickened at base; proboscis light brown. *Thorax* and scutellum shining black, bare; sides grey-dusted, the colour carried across the meta-notum; humeri brownish-yellow. *Abdomen* shining black, 1st

segment conspicuously grey-dusted; genitalia black, shining; venter black, but less shining than the dorsum. *Legs* nearly wholly yellow; coxæ black; tips of tarsi blackish-brown. No ciliation behind middle femora; hind femora not shining on under side. *Wings* clear; third costal segment wholly brownish-yellow; longer than 4th segment; anterior cross-vein placed just before one-third of the discal cell; 4th longitudinal vein forming a wide curve before posterior cross-vein, and distinctly bisinuate beyond; first posterior cell rather narrowly open; halteres dirty yellow, the clubs blackish.

Length, 3 mm.

Described from a single ♂ in the Indian Museum, taken by me at Darjiling, 29. v. 1910.

17. Pipunculus luteipes, sp. nov.

♀. *Head* with frons rather broad, slightly widening from vertex downwards, distinctly though not greatly contracted throughout that portion in contact with the exceptionally enlarged eye-facets, blackish-grey, but the whole frons with a silvery-white shimmer if viewed from above; face wholly, brilliantly shining white. Antennæ black; 3rd joint considerably elongate, with long pointed tip, bright yellow, with a white shimmer viewed from above. Mouth-parts withdrawn; occiput moderately puffed out, blackish grey, white-dusted laterally. *Thorax* and scutellum moderately black, dusted with olive-brown. *Abdomen* ash-grey; 1st segment with a basal olive-brown band; 2nd segment wholly ash-grey; 3rd, 4th and 5th with olive-brown bands basally, the colour not or barely reaching the side margins and then only basally, but extending posteriorly nearly or quite to the next segment. Genitalia very large, fully as wide as last segment, with a deep groove on upper side of the globular basal piece; ovipositor reddish-brown. *Legs* wholly rather pale yellow to the tips of the tarsi, but the minute black bristles on the joints of the tarsi give them a slightly darkened appearance; claws much lengthened, pulvilli pale yellow, very greatly enlarged. *Wings* pale grey; stigma pale brownish, ill-defined; anterior cross-vein distinctly before middle of discal cell; halteres pale yellow.

Length, 2½ mm.

Described from a perfect ♀ from Pusa, Bengal, 11. iv. 1913.

Type given by Mr. T. B. Fletcher to the British Museum.

This must be near *P. hepaticolor*, Beck., owing to the highly developed claws and pulvilli, but that species has a black streak on the upper side of the femora, the wings are slightly infuscated, the stigma conspicuous and the tip of the 3rd antennal joint is blunted, not considerably elongated. *P. hepaticolor* was described from Singapore.

18. **Pipunculus quartarius**, *Brun.*

Pipunculus quartarius, Brunetti, Rec. Ind. Mus. vii, p. 493 (1912).

♀ *Head* with frons shining black, wide, lower part with white shimmer as seen from below; face with white shimmer; proboscis brownish-yellow; eyes with the facets contiguous to the region of the antennæ very much enlarged; antennæ blackish, 3rd joint yellowish-white with long white style; arista very long, black; back of head considerably puffed out, cinereous-grey, with a tendency to whitish on postocular orbits, bearing a slight fringe of pale hairs. *Thorax* dark cinereous-grey, slightly shining; sides of thorax a little lighter; scutellum concolorous with dorsum; metanotum light grey. *Abdomen* blackish-grey, practically bare, but microscopically pubescent, slightly shining; 1st segment grey; 5th segment widest; ovipositor of moderate length, shining brown, with a little hair at its base; venter cinereous-grey, unmarked. *Legs* mainly black; tips of fore coxæ, tips of all femora rather broadly, basal third and tips of tibiæ, and apical part of all tarsi, black; femora not shining and absolutely bare. *Wings* clear; stigma absent, but the 3rd costal space much reduced, and the veins limiting it somewhat thickened; anterior cross-vein placed slightly before one-fourth of the discal cell; 4th longitudinal running nearly straight from its junction with the posterior cross-vein up to the 3rd vein, which it almost meets rather sooner than usual, thence running parallel with it to the border for a longer distance than in most species; halteres pale brownish-yellow.

Length, 1¾ mm.

Described from a unique ♀ in the Indian Museum, taken in Calcutta, 13. xii. 1907.

A second specimen in the same collection may possibly be this species, varying only in being larger, with the back of the head shining black, instead of greyish, and the abdomen more blackish and more shining. Taken at Simla, 7. v. 1910 (*Annandale*).

19. **Pipunculus mirabilis**, *Brun.*

Pipunculus mirabilis, Brunetti, Rec. Ind. Mus. vii, p. 492 (1912).

♀. *Head* with front rather narrower at vertex, which is black; frons greyish-white, face below antennæ similar, and with a silvery-white sheen when seen from above; mouth light brown; eyes light brown; the facets in the vicinity of the antennæ much larger; (antennæ missing); occiput rather well puffed out. *Thorax* blackish-æneous; humeri yellowish-brown; edge of dorsum and sides of thorax greyish; a broad stripe of grey with silver reflections extends across the metanotum and embraces the metapleura on each side; scutellum light yellowish-brown, the posterior part and margin with long pale pubescence. *Abdomen* ash-grey; on the 2nd segment is a large round brown spot in

the middle; on the 3rd, 4th and 5th are black basal bands, very narrow in the centre, and much widened at the sides of the segments; on the 6th the black band is of uniform width and very narrow; this segment bears a long ferruginous-brown process bent under the venter, with hairs towards its tip. The whole abdomen is covered with rather long (but not dense) pale hairs, mixed with a number of black ones, these latter having no relationship to the black parts in the ground-colour. *Legs*: coxæ brown, with a little silvery reflection in certain lights; remainder of legs bright lemon-yellow, practically bare, but the tibiæ have several rows of almost microscopic spines towards the apices; tips of tarsi dark brown; claws and pulvilli much enlarged; inner side of hind femora not shining. *Wings* quite clear, extreme base very pale yellow; anterior cross-vein placed at two-fifths from the base of the discal cell; 4th longitudinal vein taking an outward curve on quitting the posterior cross-vein; 3rd costal segment twice as long as 4th and about equal in length to the 5th; halteres pale yellow.

Length, 4 mm., without ovipositor.

Described from a perfect ♀ in the Indian Museum from Margherita, Assam.

A very striking and beautiful species and apparently closely allied to Becker's *hepaticolor*, from which I differentiate it as follows: there is no darkening of the stigma; the thoracic dorsum is blackish not greyish; the abdominal marks are somewhat different; the femora have no black streaks above; and the anterior cross-vein is placed distinctly before the centre of the discal cell.

20. **Pipunculus limpidipennis**, *Brun.*

Pipunculus limpidipennis, Brunetti, Rec. Ind. Mus. vii, p. 491 (1912).

♂ ♀ *Head* with frons of uniform width, greyish, with a silvery-white shimmer when seen from above; face below antennæ similar; antennæ blackish, 3rd joint white with silver shimmer; arista black; eyes (in ♀) with the facets much larger on each side of the frontal space than those behind; back of head prominent, grey, with a whitish shimmer. *Thorax* dark æneous-grey, moderately shining, bare; sides and humeri a little lighter; scutellum æneous-black, bare, shining. *Abdomen* concolorous, with a slight olive-green tint, submetallic, bare, unmarked; venter unicolorous; the last abdominal segment bears in the ♂ a knob-like process, and in the ♀ a long horny process bent under the venter. *Legs*: femora blackish, base and tips yellowish-brown; tibiæ with a broad blackish ring, occupying the middle third or more; tarsi yellowish brown; no ciliation on middle femora; hind femora shining black on inner side. *Wings* quite clear; 4th longitudinal vein, after quitting the posterior cross-vein, running almost straight to the wing-border, without being

bent outwards in a bow; anterior cross-vein almost exactly over centre of discal cell; no distinct stigma, but the costal vein is a little thickened along the 3rd and 4th segments; 3rd and 4th costal segments of about equal length, and taken together only half the length of the 5th segment; wings barely pale yellowish at base; halteres pale livid yellow.

Length, nearly 2 mm.

Described from 5 ♂ ♂ and 1 ♀ in the Indian Museum: Calcutta, 4. ix.–20. xi. 1907 and 22. v. 1909; Puri, Orissa Coast, 20. i. 1908; Benikhola, frontier of Nepal, 7. ii. 1908; Igatpuri, Western Ghats, Bombay, 20. xi. 1909 (*Annandale*), 9. x. 1913; Balasore, 16. x. 1914; Pusa, 24. iv. and 21. x. 1914.

21 **Pipunculus nitens**, *Brun.*

Pipunculus nitens, Brunetti, Rec. Ind. Mus. vii, p. 492 (1912).

♂ *Head* with frons and face shining silvery-white; eyes contiguous for some distance; antennæ black, 3rd joint, except at the base, reddish-yellow; back of head blackish-grey, rather well puffed out, with silver shimmer at least round the edge. *Thorax* blackish, with a slight bluish tint, moderately shining, practically bare; sides dark-bluish grey, with a little whitish shimmer in certain lights; scutellum concolorous, with a few hairs; metanotum with a greyish-white shimmer. *Abdomen* shining bluish-black, with some short whitish hairs; 1st segment pale bluish-grey; genitalia rather small, clubbed, concolorous. *Legs*: femora black, except at tips, with a little grey shimmer; rest of legs yellow; the tibiæ with a broad band (apparently not always complete) occupying nearly their entire length; tips of tarsi blackish on upper side; hind femora apparently not shining on inner side. *Wings* clear; 3rd costal segment very short; 4th very slightly yellowish, practically clear; anterior cross-vein exactly at middle of discal cell (in one specimen) or immediately before it (in the 2nd specimen).

Length, 2 mm.

Described from two specimens in the Indian Museum from Maddathorai, at the western base of the Western Ghats, Travancore State, South India, 19. xi. 1908 (*Annandale*); Pusa, 22. x. 1908.

I suspect that this and *limpidipennis* may represent but a single species, as some specimens show neither distinct greenish nor bluish tinges, being moderately shining blackish.

Genus **VERRALLIA**, *Mik.*

Verrallia, Mik, Wien. Ent. Zeit. xviii, p. 133 (1899).

GENOTYPE, *Cephalops auctus*, Fln. (Europe); by original designation.

Characters of *Pipunculus*; differing in shape of back of head, which is nearly flat, or even concave, instead of being much puffed

out. Second antennal joint distinctly bristly above and below; 3rd joint with rounded instead of pointed tip; a pair of ocellar bristles present. Femora without microscopic bristles below, but anterior femora pilose behind, and the hind femora and tibiæ in front. Anterior cross-vein placed at about middle of discal cell.

Range. Only about half-a-dozen species were previously known, from Europe, North America and China.

The two Indian species are easily distinguished:—

Legs principally yellow	*argentisegmentata*, Brun.
Legs principally black.	*plumbella*, Brun.

22. Verrallia argentisegmentata, *Brun.*

Verrallia argentisegmentata, Brunetti, Rec. Ind. Mus. vii, p. 494 (1912).

♂. *Head* with frons black; face grey, with silvery-white shimmer when seen from above. Antennæ yellow; 3rd joint rounded at tip; arista black; 2nd joint bristly above and below. Eyes contiguous on vertex, facets small, uniform in size; mouth reddish. *Thorax* blackish, moderately shining; scutellum æneous-black; metanotum grey; sides of thorax dark grey. *Abdomen* velvet black; posterior borders of segments with a band (of varying width) of shining bright silvery-leaden colour. Genitalia large and thick, light tawny-brown, shining and extended below the venter for some distance, the tip being pointed and bisected. *Legs*, except the brown coxæ, uniformly yellow; quite bare, except for some minute spines on the tibiæ; tarsi brown on upper side. *Wings* pale grey, iridescent; 4th longitudinal vein, after quitting the posterior cross-vein, running nearly straight to the wing-border; anterior cross-vein placed at one-third of the discal cell; stigma yellowish-brown; 3rd costal segment nearly twice the length of the 4th, but rather difficult to judge; 3rd and 4th rather longer than the 5th; halteres pale yellow.

Length, $3\frac{1}{2}$ mm.

Described from one ♂ from Mergui and one ♂ (*type*) taken by Dr. Annandale in jungle at the base of the Dawna Hills, Lower Burma, 1. iii. 1908, both specimens in the Indian Museum.

The blunted 3rd antennal joint and head not puffed out behind cause me to place this species in *Verrallia*, but I do not perceive the distinct ocellar bristles which also characterize this genus. One of the specimens (from Mergui) is gummed on cork, the vertex being almost invisible, and the bristles are not present in the second example, but may have been accidentally broken off. The head of the Dawna Hills specimen is however otherwise in perfect condition.

23. Verrallia plumbella, *Brun.*

Verrallia plumbella, Brunetti, Rec. Ind. Mus. vii, p. 495 (1912).

♀. *Head* with vertex black; frons and face both of uniform width, with white shimmer; proboscis yellow; facets in front

considerably larger than the others; back of head only just projecting beyond the postocular orbit, grey, with a whitish reflection; (antennæ missing). *Thorax* and scutellum black, moderately shining; sides and metanotum apparently concolorous; scutellum with a row of minute hairs on posterior border. *Abdomen* shining lead colour, with a few microscopic hairs; the base of each segment, narrowly in the centre and more broadly towards the sides, dead jet-black; 6th segment the longest, bearing a thick blackish-grey pointed genital organ, terminating in a long shiny brown ovipositor. *Legs* (middle pair missing) black, barely shining; tips of femora rather narrowly, and base of tibiæ broadly, reddish-yellow; base of tarsi yellowish-brown, tips black, with a few hairs; claws small, pulvilli distinct and white. Legs microscopically pubescent and the fore femora with a few very small bristles below, near the tip. *Wings* quite clear; stigma pale brownish-yellow, stigmatic segment barely longer than following segment; anterior cross-vein just before middle of discal cell; 4th longitudinal moderately sinuous after quitting the posterior cross-vein.

Length, 3¼ mm.

Described from a single specimen in the Indian Museum from Kurseong, 5000 ft., 5. vii. 1908 (*Annandale*).

Kertész has (on Becker's authority) removed both of Thomson's species, *armatus* and *abscissus*, to *Verrallia*, in Ann. Mus. Hung. i, p. 465, 1903; yet Thomson in his lengthy description of *armatus* distinctly says of the 3rd antennal joint "apice rostrato acuminato," but does not mention any pilosity of the 2nd joint. He mentions the very narrow postocular orbit of *armatus*. My present species appears to be distinct from both of Thomson's; *armatus* having very short brown antennæ, rather smoky anterior portion of the wings and mainly black femora, this last character being present in *abscissus* also*.

Family SYRPHIDÆ.

Head about as wide as thorax. Eyes varying from bare to densely hairy, sometimes pubescent in one sex only; facets in ♂ sometimes larger in front; generally contiguous or closely approximate in ♂, rarely wide apart (*Sphegina*, *Microdon*); always wide apart in ♀ with rare exceptions and always wider apart in ♀ than ♂ even if only slightly so. Frons flush with eyes, moderately or strikingly prominent. Face varying to about the same extent; in the more usual form in typical genera distinctly projecting beyond eyes in profile, usually distinctly cut away immediately below antennæ, then produced into a central bump of varying size and shape, then retreating again and finally again produced over upper border of mouth. Excavation below central

* *P. armatus* is replaced by Kertész in *Pipunculus* in Cat. Dipt. vii, p. 369 (1910).

bump often absent; the whole face sometimes conically and conspicuously projected forwards or diagonally downwards (*Ascia*, *Rhingia*, *Volucella*), sometimes enormously so (*Lycastris*). In some genera, especially in those in which the frons is distinctly produced, with the antennæ set at the extreme tip, the face descends almost perpendicularly from below the antennæ (*Chrysotoxum*, *Ceria*); in others it forms a uniform convexity (*Microdon*). Sides of face sometimes with distinct eye-margins (*Chilosia*), which usually bear a different kind of pubescence to that of the rest of the face. Frons and face varying from entirely bare to densely pubescent. Antennæ generally situated distinctly above middle of head in profile; normally comparatively short, drooping; 1st and 2nd joints very short, 2nd more or less cup-shaped, generally widest at tip, 3rd rounded, oblong, ovate or elongate: in some genera the whole antenna is conspicuously elongate (*Chrysotoxum*, *Microdon*, *Mixogaster*). Arista dorsal, nearly basal, varying from entirely bare to densely and long plumose (*Volucella*). Proboscis soft, generally short or moderately long, seldom as long as height of head; rare exceptions occur in which it is extremely long and attenuated, as long as the whole body (*Lycastris*); labella moderately large; palpi one-jointed, slender, rarely conspicuous. Three ocelli.

Thorax quadrate, oblong, oval or sometimes transverse, moderately arched, generally with soft pubescence; occasionally some bristly hairs about the humeri, side margins, base of wings or hind corners of dorsum. Scutellum moderately large, generally semicircular, generally concolorous with thorax and similarly clothed; not infrequently yellowish and more or less translucent even when the thorax is dark coloured; unspined, with very rare exceptions (*Microdon* being the only Oriental one).

Abdomen of at least four distinct segments *, usually five or six, a seventh sometimes present in *Sphœrophoria*; very variable in shape, curvature and thickness; sometimes longer and narrower than thorax (*Baccha*, *Sphœrophoria*); ovate (*Syrphus* etc.); flat and broad (*Didea*), linear (*Platychirus*, *Xylota*); cylindrical (*Syritta*); clavate (*Ascia*, *Baccha*, *Doros*, *Ceria*); short and rounded and densely pubescent (*Criorrhina*, *Arctophila*); in the majority of genera only moderately pubescent. Genitalia usually not prominent, often wholly concealed, the ♂ organs normally twisted to the right; in ♀ simple.

Legs generally simple and not strong, especially in ♀; in the ♂ in some genera bearing tooth-like or spiny processes, or actual spines or bristles, on under side of hind femora; tibiæ often curved or twisted. In one genus (*Platychirus*) the legs in the ♂ afford strong structural characters in most of the species.

Wings with a characteristic and rather constant venation. Auxiliary vein ending at about middle of wing; 1st and 2nd veins long, slightly sinuous; marginal cell open or closed near margin; submarginal cell always widely open. 3rd vein always simple,

* One European genus, *Triglyphus*, has only three obvious segments.

ending at wing-tip; in two subfamilies and certain other genera dipped downwards into 1st posterior cell, sometimes conspicuously so; 1st posterior cell always closed by the upturned apical section of 4th vein; discal cell similarly closed by the apical section of 5th vein, these two upturned endings generally more or less parallel with the hind margin of the wing. Anterior cross-vein before, at, or beyond middle of discal cell (which latter is invariably present), erect or strikingly oblique; anal cell always long, closed, at a short distance from wing-margin. 1st basal cell always distinctly longer than 2nd. 2nd longitudinal vein in some few genera with bristly hairs on basal section. A so-called vein or *vena spuria* is always present (except in *Graptomyza*) and is peculiar to this family. It is merely a chitinous fold in the wing that runs diagonally along the 1st basal cell from near the origin of the 3rd vein, crossing the anterior cross-vein on its lower half, dying away near tip of discal cell, gradually approaching the latter. This false vein is sometimes very distinct, at other times very faint. A second similar false vein occurs just below the basal part of the 5th vein*.

Life-history. The larvæ are amphipneustic, apparently acephalous, of about 11 uncertain segments, with rough skin, often pigmented, especially in SYRPHINÆ; the posterior spiracles near together at tip of body. Puparium with thoracic spiracle-horns, and sometimes with smaller anterior horns that mark the position of the larval spiracles. Abdominal spiracles in pupa also prominent, much as in larva. Of many European species the metamorphoses have been adequately described and figured, *Syrphus ribesii* and *pyrastri* by De Geer, the latter again by Réaumur, and *Helophilus pendulus* by Walker; whilst Bouché, Schäffer, Swammerdam, Van Roser and others have contributed to our knowledge of the early stages in SYRPHIDÆ. A large number of the species are aphidiphagous in the larval state (*Syrphus* etc.); others live in decaying wood (*Xylota* etc.) or in the sap flowing from injured trees (*Brachyopa* etc.); some in decaying vegetable matter or in drains (*Eristalis* etc.); in stems of plants or fungi (*Chilosia*); in nests of the larger Hymenoptera, such as *Vespa* and *Bombus* (*Volucella*). Some live in bulbs or in rotten onions (*Merodon*, *Eumerus*); *Microdon* in ants' nests; whilst one species is reputed to live in cow-dung (*Rhingia*) †. A bibliography of the biology was given by F. Brauer (Systemat. Studien auf Grundlage der Dipteren-larven, in Denk. Ak. Wien, Math.-Naturwiss. Klasse, xlvii. 1883); while more recently C. L. Metcalf has published much information on the biology of this family in a study of

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* Verrall stated that he thought this second vein had not been recorded before, but Walker (Ins. Brit. Dipt. ii, p. 235) distinctly notes them both. Some pedantic authors have desired to throw out the genus *Graptomyza*, owing to the absence in it of the *vena spuria*, but this genus is now universally recognized as belonging to this family.

† The above is mainly from Verrall, 'British Flies,' Syrphidæ, p. 131.

the Syrphidæ of Ohio (Ohio Biol. Survey Bull. i, pp. 7–122, pls. i–xi (Columbus, 1913); see also Ohio Naturalist, vol. xiii, pp. 81–91, pls. iv–v, 1913) *.

The perfect insects are mostly sun-lovers, and are in fact frequently called "sun-flies," occurring practically in any situation on warm days, especially on flowers and sweet-smelling plants. They are amongst the most skilful hoverers in the whole of the Diptera, returning again and again to the same spot after frequent strokes of the net have been made to capture them. Some species fly with a loud shrill hum, and many bear close resemblance to bees, wasps, and hornets (*Volucella*, *Criorrhina*, *Eristalis*, *Microdon*, *Spilomyia* and the CERIINÆ), whilst certain genera of smaller species (*Eumerus*, *Paragus*, *Pipiza*, etc.) appear to mimic some of the smaller aculeate Hymenoptera (*Halictus* etc.), and Verrall thinks there is some connexion between them. The more typical forms, such as *Syrphus* and its allies, are of moderate or rather small size, mostly with yellow as the prevailing colour; or else of a dark colour with yellow spots and transverse abdominal bands, frequently with similarly coloured callus-like spots on the thorax.

The SYRPHIDÆ are a natural and well-defined group, and are usually the first to attract the notice of collectors from their general distribution, bright colours and the ease with which many species may be identified. The family is unquestionably allied to the PIPUNCULIDÆ on the one hand, by the elongate anal cell and the discal cell projected distally, and through the same characters to the CONOPIDÆ, but the latter family, owing to the subfamily MYOPINÆ being akin to the MUSCIDÆ, is usually placed (with the ŒSTRIDÆ also) between the SYRPHIDÆ and the MUSCIDÆ.

Table of Subfamilies.

1.	Antennæ moderately long, generally drooping; if very elongate or porrect, not seated on a produced frons . .	2.
	Antennæ very porrect; frons conspicuously produced (except in *Microdon*, which is distinguished by its peculiar venation) .	5.
2.	Anterior cross-vein before middle of discal cell	3.
	Anterior cross-vein at or after middle of discal cell: generally sloping	4.
3.	Marginal cell open; apical section of 4th vein not recurrent (rare exceptions); arista bare or at most slightly pubescent	SYRPHINÆ, p. 27.

* Summaries of what is known of the biology are given (in English) under the various genera by Lundbeck, 'Diptera Danica,' Part V (Copenhagen, 1916); this work is several times cited in the present book. For some information on the biology of common European species (*Melanostoma*, *Lasiopticus*, *Syrphus*), see also L. N. Staniland in the Fruit Grower, Fruiterer, Florist and Market Gardener' (London), vol. 53, nos. 1365–6, 26. i. & 2. ii. 1922, pp. 143–4, 185–7, 10 figs. (abstract in Rev. Appl. Ent. Ser. A. x, April 1922, p. 185).

Marginal cell normally closed (rarely open, *Graptomyza* etc.); apical section of 4th vein distinctly recurrent; antennæ extremely plumose	VOLUCELLINÆ, p. 134.
4. Third longitudinal vein distinctly looped downward into 1st posterior cell . .	ERISTALINÆ, p. 154.
Third vein not distinctly looped downward, but often slightly curved downward	MILESIINÆ, p. 226.
5. Third vein without any downward loop or any appendix in 1st posterior cell . .	[p. 294. CHRYSOTOXINÆ,
Third vein with either a downward loop or an appendix in 1st posterior cell . .	6.
6. Arista dorsal; antennæ never seated on a petiole; 3rd vein not downward looped, but with an appendix extending across middle of 1st posterior cell; 4th vein distinctly recurrent in apical section; scutellum with a blunt spine or tooth at each hind corner.	[p. 307. MICRODONTINÆ,
An apical style; antennæ generally seated on a conspicuous petiole; 3rd vein with a downward loop generally ending in a sharp point with an appendix (as in MICRODONTINÆ) but shorter; 4th vein never recurrent at tip; scutellum unarmed	CERIINÆ, p. 321.

Though authors are not unanimous as to the number of subfamilies to be recognized nor as to their exact limits, the above series probably meets the views of the majority of present-day writers, and it was the one adopted by Verrall. The exact affinities of several genera, *Sericomyia* and *Myiolepta* for instance, still remain uncertain.

Subfamily SYRPHINÆ.

Head: antennæ moderately long, usually more or less pendant, if elongate and more or less porrect then not placed on a produced frons or prominence; arista bare or at most moderately pubescent, never plumose; face excavated or not below antennæ, with or without central bump, generally produced, often conspicuously so, over upper border of mouth; pubescence very variable in quantity. Eyes varying from bare to densely pubescent, generally contiguous in ♂ for a greater or less distance. *Thorax* and *abdomen* of normal relations to head, or the latter extremely attenuated, sometimes rounded. *Legs* generally simple, sometimes (*Platychirus*) with conspicuous specific characters; femora seldom spinose or dentate. *Wings* with very uniform venation; marginal cell always distinctly open, 3rd vein seldom looped downward into 1st posterior cell; anterior cross-vein almost always distinctly before middle of discal cell; tip of 4th vein not recurrent (except in *Orthoneura*).

This subfamily is rather a heterogeneous one, but it is difficult satisfactorily to subdivide it without making a number of groups and leaving over certain intermediate or abnormal genera.

Several groups have been suggested, of which none have met with anything like universal approval. Verrall* treats effectively of the attempts at subdivision, which need not be recapitulated here, since they are not generally adopted. He also thinks that different relationships exist among these insects, judging from the very different larval habits of some of those the life-histories of which are more or less known.

Table of Genera †.

1.	Face flat or retreating (*i. e.* not arched, nor with a central knob; rarely (*Psilota*) produced at upper mouth-edge), being from the prominence of the frons down to the mouth almost parallel with the eye-margin. Eyes and face hairy; face all blackish or æneous ‡; dark-coloured species with no pale markings on head or thorax. .. .	2.
	Face with a central knob, or else arched, or produced cone-like and not at the upper mouth-edge only §. . . .	3.
2.	Face with upper mouth-edge not produced	PIPIZELLA, Rond., p. 36.
	Face with upper mouth-edge conspicuously produced.	PSILOTA, Meig., p. 38.
3.	Face arched, not hollowed below frontal prominence; always more or less yellow.	PARAGUS, Latr., p. 30.
	Face hollowed below frontal prominence ‖, produced again to central knob, or to upper mouth-edge, or to both ..	4.
4.	Wholly dark species, without pale markings; at most under side of 3rd antennal joint or knees are pale ¶ . .	5.
	Species with pale markings on head, thorax, scutellum or abdomen **. .	6.
5.	Third antennal joint more or less elongate; apical section of 4th vein recurrent, about perpendicular to longitudinal axis of wing	[p. 40. ORTHONEURA, Macq.,
	Third antennal joint not elongate; apical section of 4th vein not recurrent; forming an acute angle with 3rd vein and with longitudinal axis of wing	CHILOSIA, Meig., p. 41.

* Brit. Flies, Syrphidæ, p. 137.

† The present table is constructed almost entirely from Verrall's table of the European genera.

‡ Two species referred to *Pipizella* have yellowish faces.

§ In doubtful cases the face and eyes are nearly always bare.

‖ Except in some species of *Sphærophoria*.

¶ Some ♀ ♀ of *Melanostoma* and melanoid specimens of *Platychirus*, *Melanostoma* and *Syrphus* might apparently fall in section 4 and be mistaken for *Chilosia*, but the latter genus is known from all others by its eye-margins.

** Unicolorous females or melanoid ones might be mistaken for *Chrysogaster* or *Chilosia*, but species of the former are more or less metallic, and those of the latter genus possess eye-margins.

6.	Face with central knob, seldom considerably produced at upper mouth-edge	7.
	Face without central knob, generally much produced at upper mouth-edge	18.
7.	Abdomen conspicuously constricted at base	Baccha, Fabr., p. 113.
	Abdomen not conspicuously constricted at base	8.
8.	Face and scutellum wholly æneous or black*	9.
	Face partly yellowish*	10.
9.	Front tibiæ or tarsi dilated in ♂; in ♀ simple	[et Serv., p. 52. Platychirus, St. Farg.
	Front tibiæ and tarsi simple in ♂ and ♀	Melanostoma, Sch., [p. 46.
10.	Thorax with conspicuous yellow side lines; pleuræ also with yellow marks.	11.
	Yellow side lines on thorax inconspicuous or absent; pleuræ without yellow marks.	12.
11.	Abdomen ralatively broader, about as wide as thorax .	[p. 94. Xanthogramma, Sch.,
	Abdomen relatively narrower, always narrower than thorax	[et Serv., p. 99 †. Sphærophoria, St. Farg.
12.	Abdomen with sharply-defined yellow bands or pairs of yellow spots or lunules	13.
	Abdomen without such yellow marks	17. [p. 66. Lasiopticus, Rond.,
13.	Frons inflated ..	14.
	Frons not inflated	16.
14.	Third longitudinal vein dipped downwards into 1st posterior cell .	15.
	Third vein not dipped downwards (rare exceptions)	Syrphus, Fabr., p. 69.
15.	Frons less abruptly produced into an antennal prominence; mouth-opening short and oval; ocelli placed near vertex	Asarcina, Macq., p. 63.
	Frons rather abruptly produced into an obtuse antennal prominence; (abdomen broader and flatter than in *Syrphus*; facial bump more prominent than in *Syrphus*, and submarginal cell a little broadened at middle and tip); mouth-opening narrow and linear; ocelli placed at some distance from vertex	
16.	Eyes practically bare; 3rd vein well-dipped ‡	Didea, Macq., p. 56.
	Eyes closely pubescent; 3rd vein much less dipped ‡	Dideoides, Brun., p. 57.

* Some care is required to decide these characters.
† Ischiodon, Sack, also falls in this section ; see p. 97.
‡ These secondary characters are weak.

17. Abdomen short ovate, considerably broader than the transverse thorax	ERIOZONA, Sch., p. 103.
Abdomen like that of *Syrphus*; thorax not transverse .	[p. 65. ISCHYROSYRPHUS, Big.,
18. Alulæ of normal size	19.
Alulæ extremely small; eyes in ♂ separate	20.
19. Epistome produced into a distinct snout; eyes in ♂ contiguous . ..	RHINGIA, Scop., p. 129.
Epistome not snout-like; eyes in ♂ distinctly though rather narrowly separated	[de Meij., p. 111. SPHEGINOBACCHA,
20. Apical section of 4th vein not recurrent; hind femora not thickened or spinose	[p. 127. RHINOBACCHA, de Meij.,
Apical section of 4th vein recurrent; hind femora thickened and spinose	21.
21. Face deeply hollowed below antennæ; apical section of 4th vein rounded at the angle	SPHEGINA, Meig., p. 106.
Face only slightly hollowed below antennæ; flexure of 4th vein almost rectangular ..	ASCIA, Meig., p. 105.

Genus **PARAGUS**, *Latr.*

Paragus, Latreille, Hist. Nat. Crust. Ins. xiv, p. 359 (1804).

GENOTYPE, *Mulio bicolor*, Fabr.; by original designation.

Head rather flattened, broader than thorax; face not cut away below antennæ, but produced towards a large central bump. Eyes pilose, contiguous in ♂; antennæ nearly porrect, rather long, 3rd joint usually longer than 1st and 2nd together; arista dorsal.

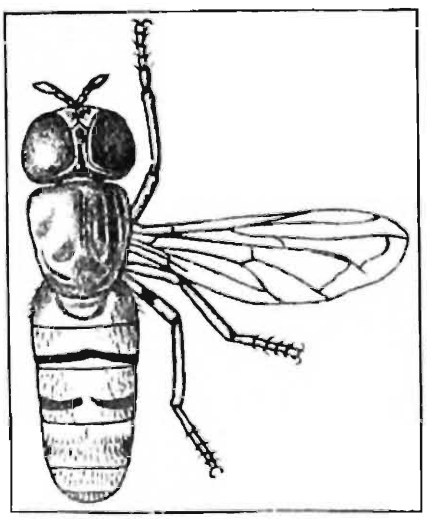

Fig. 8.—*Paragus luteus*, Brun.

Thorax quadrate, arched, with soft pubescence; scutellum rather large, unspined except in *P. serratus*, Fabr. *Abdomen* as wide as thorax, usually linear, with a shallow transverse depression on each of the segments, the latter about subequal in length. *Legs* simple, moderately slender. *Wings* with normal venation except

that the apical sections of 4th and 5th veins are undulating, not parallel with wing-margin; anterior cross-vein distinctly before middle of discal cell.

Range. World-wide.

Life-history not known, but the larvæ are reputed to feed on Aphides occurring on *Centaurea* and *Sonchus*, according to Rondani; and Verrall, from whom this note is culled, suspects them of being in some way connected with the small aculeate Hymenoptera, as *Halictus*. Dr. de Meijere has noted the Oriental species.

Stoutly built, rather small dark flies, often with pale markings on face, abdomen and legs.

Table of Species.

1. Scutellum conspicuously serrate on hind margin .	*serratus*, Fabr., p. 31.
Scutellum not serrate .	2.
2. Abdomen wholly black*	3.
Abdomen yellowish, reddish or with a broad pale band	4.
3. Face with a distinct median black stripe from below antennæ to mouth-opening	*indicus*, Brun., p. 33.
Face without stripe, at most a slight extension upwards of the black colour of the mouth-border .. .	*atratus*, de Meij., p. 33.
4. Scutellum wholly black .. .	*rufiventris*, Brun., p. 34.
Scutellum with hind margin more or less broadly pale	5.
5. Face without stripe; legs all yellow except a narrow black band on hind femora .	*luteus*, Brun., p. 35.
Face with black stripe (sometimes reduced in ♂); legs with about basal half of femora black	*bicolor*, Fabr., p. 35.

24. **Paragus serratus**, *Fabr.* (Pl. I, figs. 6, 7.)

Mulio serratus, Fabricius, Syst. Antliat. p. 186 (1805).
Paragus serratus, Wiedemann, Aussereur. Zweifl. ii, p. 88 (1830); Brunetti, Rec. Ind. Mus. ii, p. 52 (1908), xi, p. 201 (1915); de Meijere, Tijd. v. Ent. li, p. 284 (1908).

♂ ♀ *Head*: eyes in ♂ absolutely contiguous for a short but appreciable distance; bare, except for three longitudinal, about equidistant, stripes of whitish pubescence; vertical triangle elongate, nearly three times as long as the distance of ocular contiguity, shining black or blue-black with short black hairs; ocelli placed well away from vertex; anterior part of frons for a short space with yellowish-grey dust; frontal triangle very small, and, with the whole face, orange-yellow with short sparse whitish pubescence; mouth-opening large, brown; a narrow brownish-black

* Some European specimens of *P. bicolor* have the abdomen wholly black, so that some care is required in identifying these species.

median stripe on face. Antennæ large and elongate, blackish, lower part of 2nd and 3rd joints more or less brownish-orange; arista bare. Occiput exceedingly concave, dark grey with a little short yellowish or greyish pubescence on margin. *Thorax* rather shining blue-black, punctulate; with a pair of greyish rather narrow median stripes, generally united broadly in centre of anterior margin, thence diverging and narrowing, disappearing before hind margin; whole dorsum with yellowish-brown pubescence, which is longer and more yellowish in the humeral region. Sides of thorax shining black, punctulate, with a conspicuous stripe of greyish-white long pubescence from below humeri to sternopleuræ. Scutellum black, punctulate with brownish pubescence, hind margin broadly yellow with serrated edge of about 13 to 16 teeth. *Abdomen* so variable that a normal example is difficult to select; perhaps the most typical form is as follows:—Finely punctate; 1st segment generally black, sometimes partly or wholly reddish-brown; 2nd generally reddish-brown or orange-brown, more or less blackish on anterior margin broadly, or towards sides, or both; 3rd, 4th and 5th segments varying from wholly some shade of brown or yellowish to nearly wholly black, or with their centres or sides mainly black; 3rd and 4th segments with a whitish dust-band on each side on the anterior margin, these bands not united in median line; 5th with a similar, sometimes broader dust-band, uninterrupted in middle, placed rather diagonally; 6th segment from orange-brown to black, with white pubescence at tip. Anterior corners of abdomen sometimes entirely black, but always with a little long whitish pubescence. Pubescence of abdomen whitish, more obvious towards sides and on the whitish dust-bands. Venter yellowish. *Legs*: coxæ, base of fore femora broadly, about basal half of middle pair and basal three-fourths or more of hind femora, black; hind tibiæ more or less brownish on about apical half; hind metatarsi brownish-black; rest of legs orange or yellowish, a little variable; pubescence of legs whitish. *Wings* quite clear, stigma and base pale yellowish; halteres yellowish.

Length, about 5 mm.

Described from a good series in the Indian Museum, Pusa and other collections. A variable species, especially in the extent of pale colour in the abdomen. Chitlong, Nepal; Mussoorie, ix. 1906; Dehra Dun; Sukna (*Annandale*); Purnea (*Paiva*); Cawnpore District (*Caunter*); United Provinces (*Caunter*); Igatpuri, Bombay; Karachi; Allahabad, 5. x. 1905 (*Howlett*); Pusa, 27. xi. 1905 (*Lefroy*), 18. xii. 1905 Puri (*Kemp*); Madhupur, Bengal (*Paiva*); Calcutta (*var. coll.*); Bangalore; S. India; Travancore (*Annandale*); Mormugao, Goa, ix. 1916 (*Kemp*); Dawna Hills; Sadiya; Dibrugarh; Batavia; Sarawak; Papua. Apparently widely distributed in the East, and immediately recognized by its serrated scutellum. Also common in Africa.

Type ♂ in Fabricius collection.

25. Paragus indicus, *Brun.* (Pl. I, fig. 8.)

Pipizella indica, Brunetti, Rec. Ind. Mus. ii, p. 52 (1908).
Paragus indicus, id., op. cit. xi, p. 201 (1915).

♂ ♀. *Head* yellow; vertex, eyes, mouth and proboscis black; a black central line on face in ♂ and ♀; in ♀ also on frons, slightly narrowing on vertex; just below the antennæ it is hardly one-third the width of the head. *Thorax* smooth, shining black, with a little gold-brown hair on the posterior half, and a little white hair on the lower anterior portion of the sides. *Abdomen* shining black, minutely pubescent, especially on last segment, and distinctly so along the sides of all the segments. *Legs* tawny-yellow, basal half of the anterior, and basal three-fourths of the hind femora black; tibiæ yellowish-white towards the base. *Wings* clear, stigma very pale yellow: halteres yellow.

Length, 5 mm.

Described from a ♂ and two ♀ ♀ in the Indian Museum collection from the Simla District and from Katmandu in Nepal. Matiana (*type* ♂ and ♀, *Annandale*); Simla, x. 1918 (*Howlett*); Mussoorie, x. 1906 (*Howlett*); Darjiling, 6000 ft. (*Brunetti*); Katmandu, Nepal; Allahabad, 19. ii. 1906, 25. iii. 1906, 6. x. 1905 (all *Howlett*); Chapra, Bengal; Pusa, 27. x. 1913; Tenmalai, Travancore (*Annandale*).

P. indicus is very near *atratus* but apparently distinct. The 3rd antennal joint seems blacker, especially in the ♂; the abdomen is uniformly white-haired without sign of definite hair-spots; the pubescence of the scutellum is longer and more yellowish, the hairs behind the vertex are also yellow or yellowish; and finally the anterior tibiæ and tarsi are practically yellow to the tips of the latter; the hind tarsi seem to be relatively longer than in *atratus*.

26. Paragus atratus, *de Meij.*

Paragus atratus, de Meijere, Nov. Guin. Res. V. Zool. i, p. 85 (1906); id., Tijd. v. Ent. li, p. 284 (1908); Brunetti, Rec. Ind. Mus. xi, p. 202 (1915).

♂ ♀ *Head*: eyes practically touching (in Java specimen) or not quite touching (in Indian specimen) immediately above the very small frontal triangle (which is bright chrome-yellow), but contact is only at a point; vertical triangle shining black, gradually widening to vertex; eyes sparsely whitish-pubescent, in ♀ bare. Face bright chrome-yellow, shining, with a little whitish pubescence; mouth-border blackish-brown, the colour carried upwards a little along median line of face. Antennæ with 1st and 2nd joints black, 3rd rather dark brown; occipital margin with some whitish pubescence on lower part. Eyes in ♀ bare; frons shining blue-black. *Thorax*, scutellum and *abdomen* shining black, punctate; the former with short greyish pubescence, longest on mesopleura, short on abdomen; a white hair-spot

towards sides of anterior margins of 3rd and 4th segments; 5th segment nearly all white-haired; (these spots are hardly apparent in the Indian specimen). Genitalia rather small, knob-like, dark brown. Venter black. *Legs* yellow; basal half of anterior femora, rather more than half of hind pair, black or blackish-brown, rather shining: apical half of hind tibiæ brownish, tips of anterior tibiæ and all tarsi wholly brownish; hind metatarsi distinctly incrassated. Legs in ♀ sometimes darker. *Wings* pale brownish; halteres pale yellow.

Length, 5 mm.

Redescribed from a ♂ from Batavia (January, *Jacobson*), named and sent by Dr. de Meijere to the Indian Museum, and from a second ♂ in the same collection from Bijrani, Naini Tal District, base of W. Himalayas, 19.iii.1910. De Meijere's notes in 1908 are incorporated, his original description not being accessible in India. From these notes it may be inferred that the white hair-spots on the abdomen attain the middle line in the ♀, from which sex, spparently, the species was originally described.

27. **Paragus rufiventris**, *Brun.*

Paragus rufiventris, Brunetti, Rec. Ind. Mus. viii, p. 157 (1913).

♂. *Head*: frons shining black, almost bare; eyes subcontiguous only and for a very short distance; hind orbit of eyes with a fringe of white hairs, weakest behind the vertex, where the hair is darker; face very pale lemon-yellow, shining, bare, becoming nearly whitish towards the mouth, above which is a little white hair on each side: a black shining median line on the face from immediately below root of antennæ to mouth; middle part of face in profile a little protuberant. Antennæ blackish-brown; 3rd joint more or less reddish-brown below at base, arista dorsal, placed at about one-third the length of the joint; proboscis shining blackish-brown. *Thorax* shining black, punctate, covered rather closely with fine black pubescence, which clothes both the dorsum and the scutellum; the latter is concolorous. Sides of thorax black, a little conspicuous white hair in front of the wing-roots. *Abdomen* blue-black, shining, about the hind half (more or less) bright reddish-brown; whole surface of abdomen with white hairs, which extend over the sides; tip of abdomen sometimes black, or the reddish part may be black at the sides; belly generally a replica of the upper side. *Legs*: coxæ and basal half of femora black, shining, apical part of femora brownish-yellow, shading into the lemon-yellow tip, this colour extending over about the basal third of the tibiæ, remainder brownish-yellow; tarsi brownish-yellow, a little golden-yellow pubescence below the hind pair. *Wings* clear, venation normal; halteres pale yellowish-white.

Length, 5 mm.

Described from five ♂ ♂ in the Indian Museum, Mangaldai, Assam–Bhutan Frontier, 1 or 2.i.1911, *type* (*Kemp*); Sadiya, Assam,

23. ix. 1911; Quetta, v. 1892 (*Nurse*); Dhikala, Garhwal District, base of W Himalayas, 10. iii. 1910; Bijrani, Naini Tal District, 19. iii. 1910; Chapra, Bengal; Allahabad, 4. iv. 1906, 6. x. 1905 (both *Howlett*); Maddathorai (*Annandale*); Peradeniya, Ceylon, 15. vii. 1910.

28. **Paragus luteus**, *Brun.*

Paragus luteus, Brunetti, Rec. Ind. Mus. ii, p. 52 (1908); i, pl. xi, fig. 1, full ins. (1907).

♀ *Head* pale yellowish-white, vertex black, with a thin stripe (slightly enlarged in the middle) leading to a large, black, roughly square, shining spot above antennæ. Antennæ brown, base paler. Frons gradually narrowed towards vertex. *Thorax* wholly shining æneous, a whitish hairy stripe, commencing in front of the wings, and reaching downwards; scutellum yellow, base black. *Abdomen* yellow, basal segment black, and a thin black line almost (but not absolutely) on the border of 2nd segment, a similar line just below centre of 3rd segment, and a black mark on each side at the edge of the 4th segment. *Legs* all yellow, a brown ring towards tip of hind femora. *Wings* absolutely clear, no stigma.

Length, 5 mm.

Described from the type in the Indian Museum collection, from Bushire, Persia.

29. **Paragus bicolor**, *Fabr.**

Syrphus bicolor, Fabricius, Ent. Syst. iv, p. 297 (1794).
Paragus bicolor, Schiner, Faun. Austr., Dipt. i, p. 259 (1862); Verrall, Brit. Flies, Syrph. p. 152 (1901); auctt. plur.

♂ *Head*: face yellow, with a rather narrowly black mouth-edge slightly and indistinctly extended up the middle of the face; vertex yellowish at tip, bearing short, mostly pale pubescence. Eyes with rather conspicuous whitish pubescence, which has a tendency to run into stripes, which leave the front and the back of the eyes less conspicuously hairy, and also the middle narrowly on at any rate the upper half. Antennæ long; 3rd joint about 1¾ times as long as 1st and 2nd together, pointed, narrow, about five times as long as broad; brownish above, yellowish-brown below, especially about the base, practically all black in the Quetta specimens; arista not so long as 3rd joint. *Thorax* æneous, with two faint pale lines on disc in front; pubescence all short. Scutellum pale orange over all the tip (on all apical half in Quetta specimens). *Abdomen* varying exceedingly in colour, from wholly black with reddish isolated spots on 2nd and 3rd segments (*P. lacerus*) to entirely reddish except base and tip obscurely dark, and even to the abdomen being wholly yellowish-red except at basal corners (*P. testaceus*). On the darker forms the short pubescence tends to black on the disc on hinder halves of segments, and forms

* There are several synonyms which represent European varieties, but these need not be recapitulated here.

indistinct sloping pale bands or stripes, but in the *P. testaceus* form the pubescence is all pale, as are nearly all the anterior femora. In the Quetta specimens the abdomen is reddish, with rather less than apical half black. *Legs* orange, basal half of anterior, basal two-thirds of hind, femora black (in the Quetta ♂ ♀ basal third and half respectively). Hind tibiæ (normally) more or less dark about the middle. Hind femora slightly thickened about middle, and hind metatarsi rather swollen. Pubescence pale, mainly inconspicuous. *Wings* clear, stigma brownish; halteres yellow.

♀ Face yellow, usually only middle fourth black, but in dark forms as much as middle half blackish-red; usually produced only about a quarter the width of the eye. Frons all shining blue-black except on two elongated side patches of grey dust. Pubescence on disc of thorax very short, but longer and silvery on pleuræ, on abdomen exceedingly short, with a tendency to form pale fasciæ, especially near base of 3rd and 4th segments. The Quetta ♀ has rather more than the apical half of the abdomen black.

Length, about 6 mm.

Quetta, v. and vii. 1902 (*Nurse*). One ♂, one ♀, the only two examples which I know from British India, though the species occurs all over Europe and in North America.

The above description is an adaptation from Verrall.

Genus **PIPIZELLA**, *Rond.*

Pipizella, Rondani, Dipt. Ital. Prod. i, p. 54 (1856).
Heringia, id., op. cit. i, p. 53 (1856), and ii, p. 184 (*Heryngia*) (1857).
Phalangus, Megerle, in Meigen, Syst. Beschr. iii, p. 253 (1822).

Genotype, *Mulio virens*, Fabr.; by original designation.

Head about as wide as thorax; eyes densely pubescent, contiguous in ♂, wide apart in ♀; face also densely pubescent, not cut away below antennæ; no central knob, and upper mouth-border not produced. Antennæ moderately long, 3rd joint elongate; arista dorsal, bare. *Thorax* normal in size and shape, always distinctly though not conspicuously pubescent, without bristly hairs; scutellum normal, pubescent. *Abdomen* rather elongate, a little longer and broader than thorax, with 4 or 5 segments, which are subequal. *Legs* simple, hind femora varying in thickness. *Wings* with normal Syrphine type of venation; anterior cross-vein some distance before middle of discal cell. Sometimes a very short appendix at point of flexure in 4th and 5th veins.

Range. Confined to Europe, with one Persian species and two Indian.

This genus rests on a rather slender basis, that of the elongate nature of the 3rd antennal joint, as against an ovate or irregularly shaped joint, hardly longer than high, in *Pipiza*. Two other characters have been alleged, neither of which appeal to me, the supposed rectangular upper angle of the 1st posterior cell (which

is distinctly acute in *P. heringi*, a European species), and the anterior cross-vein being situated before the tip of the auxiliary vein, a position which seems to be closely approached or equalled in *Pipiza noctiluca*, L. My two species have yellowish faces, though in this genus the head has normally no pale markings.

The flies are small, blackish, shining, found in gardens and amongst low bushes in sunshiny places; and, as is the case in the closely allied genera *Pipiza* and *Paragus* also, they are very difficult to separate, even the European species in this group of genera being very insufficiently known and overweighted with synonymy.

The two Indian species may be distinguished thus:—

Legs principally yellow . .	*rufocincta*, Brun.
Femora with basal half, or more, black	*rufiventris*, Brun.

30. **Pipizella rufocincta**, *Brun.*

Pipizella rufocincta, Brunetti, Rec. Ind. Mus. ii, p. 53 (1908).

♂ *Head*: face yellowish-white with a narrow black line below antennæ, which are blackish-brown; mouth and proboscis black; vertex shining black, narrowing rather suddenly to the eyes, which are contiguous for only a very short distance. *Thorax* black, shining, with a slight æneous tinge; a few white hairs on the sides, in front of insertion of wings; dorsum with short greyish hair; scutellum unicolorous with grey hair. *Abdomen* shining black, with very short pale pubescence, the whole 3rd segment reddish-testaceous, and, in the type-specimen, extreme tip of abdomen reddish. *Legs* yellowish-white; coxæ, a narrow ring at base of anterior femora, and the basal two-thirds of hind femora, black. *Wings* quite clear.

Length, 6 mm.

Described from two ♂ ♂ taken by me at Rangoon, 23. xii. 1904 to 3. i. 1905 (*type*), and from one ♂ taken by me at Umballa (N.W India, altitude 900 ft.), 8–13. v. 1905. In my collection. Most species of *Pipizella* have unmarked abdomens, but this species is certainly of this genus, and apparently widely distributed.

31. **Pipizella rufiventris**, *Brun.* (Pl. I, figs. 9, 10.)

Pipizella rufiventris, Brunetti, Rec. Ind. Mus. xi, p. 202 (1915).

♀ *Head*: vertex æneous-black, with violet reflections and black hairs; ocelli concolorous; frons and upper part of antennal prominence shining blue-black, with black hairs; a broad grey dust band from eye to eye across middle of former; tip of antennal prominence, just between the antennæ, pale. Antennæ black, 3rd joint large and elongate; arista black. Face yellowish, with whitish pubescence, a little darker about mouth-opening; a black narrow median stripe. Eyes brown, with short distinct grey pubescence; occiput black, with yellow hairs around margin. *Thorax* æneous-black, shining, with soft yellowish-grey pubescence,

which is more whitish and ragged on the sides. Scutellum luteous, semi-translucent, a little darker in middle, pale yellow pubescent. *Abdomen* reddish-yellow, basal segment, central basal part of 2nd segment, a moderately narrow band on hind borders of 2nd and 3rd segments, apical half of 4th and all the 5th segment, black. Dorsum of abdomen with pale yellowish-grey pubescence, which is longer and thicker about the sides of 2nd segment. Venter yellowish, a broad black transverse band on 2nd segment, apical part of abdomen black. *Legs*: coxæ, basal half of anterior femora and basal three-fourths of hind femora, black; also median half of hind tibiæ, though less well defined, and upper sides of all tarsi. Rest of legs brownish-yellow; under side of hind tarsi with golden-brown pubescence. *Wings* clear, subcostal cell pale yellowish; squamæ pale yellow; halteres yellow.

Length, 7 mm.

Described from a perfect ♀ in the Indian Museum, presented by Col. Tytler, taken by him at Kousanie, 6075 ft., Kumaon District, 22. vii. 1914, and erroneously described by me as a ♂. Pusa, 5. iii. 1911.

Genus **PSILOTA**, *Meig.*

Psilota, Meigen, Syst. Beschr. iii, p. 256 (1822).

GENOTYPE, *P. anthracina*, Meigen; sp. nov.

Allied to *Pipiza* and *Chilosia*; face very prominent below antennæ; no central knob, but conspicuously produced above mouth-border; eyes contiguous for a long distance in ♂, densely hairy, especially in ♂; frons in ♀ wide; antennal 3rd joint elongate; arista bare, almost basal. *Thorax* subquadrate. *Abdomen* short, broad, ovate or rather elongate. *Legs* simple, hind femora stronger. *Wings* with anterior cross-vein very near base of discal cell; apical section of 4th vein long and slightly angulated at its middle, as 1st posterior cell is nearly twice as wide as discal on distal part of latter; apical section of 5th vein quite straight, bent up at a sharp angle; spurious vein indistinct.

Life-history unknown.

A somewhat aberrant genus, with the few venational characteristics noted.

Range. Europe, Algeria, North America, India, Australia.

32. **Psilota cyanea**, *Brun.*

Psilota cyanea, Brunetti, Rec. Ind. Mus. xi, p. 202, pl. xiii, fig. 1, head, profile (1915).

♂. *Head*: frons and face brilliantly shining violet-black; the vertical triangle demarcated by an impressed line; antennal prominence very slight; some erect brown hairs on vertex; frons

and face with sparse whitish soft hairs: viewed from above, a just perceptible whitish dust-spot about the middle of the frons, contiguous with the eye-margin on each side, and the edges of the face with vague whitish reflections in certain lights; upper mouth-border distinctly produced *; proboscis short, brownish-black. Antennæ brownish-yellow, under side of 3rd joint much paler. Eyes of exactly the same vertical height as the head, dark brown, very shortly but rather thickly pubescent; occiput slightly produced behind the vertex, æneous-black, with a fringe of short white hairs. *Thorax* shining cyaneous-black with a faint violet tinge, scutellum concolorous, both with sparse very short whitish

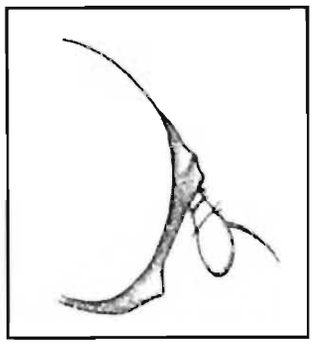

Fig. 9.—*Psilota cyanea*, Brun., head in profile.

pubescence; some rather long whitish hairs at sides, anteriorly. *Abdomen* of three obvious segments only, the first very narrow, the 2nd, 3rd and 4th subequal, the 5th barely visible; all wholly cyaneous-black, with short soft pale pubescence, belly similar. *Legs* black; knees, tips of tibiæ, and anterior tarsi brownish-orange, hind tarsi darkened above; hind femora and all tibiæ with a little pale pubescence. *Wings* almost clear; stigma pale yellow; halteres reddish-brown.

Length, 4½ mm.

Described from two ♀ ♀; Gangtok, Sikkim, 6150 ft., 9. ix. 1909, *type*; and Kurseong, 5000 ft., 10–26. ix. 1909 (*Lynch*). In the Indian Museum.

Genus **CHRYSOGASTER**, *Meig.*

Chrysogaster, Meigen, Illig. Mag. ii, p. 274 (1803).
Campeneura, Rondani, Dipt. Ital. Prod. i, p. 52 (1856).
Campineura, id., op. cit. ii, p. 12 (1857).
Cryptineura, Bigot, Rev. Mag. Zool. (2) xi, p. 308 (1859).
Cryptoneura, id., Ann. Soc. Ent. France, (6) ii, Bull. p. xix (1882).
Camptoneura, Williston, Bull. U. S. Nat. Mus. No. 31, p. 31 (1886).

GENOTYPE, *Eristalis solstitialis*, Fall. (as *cœmiteriorum*, Fabr.); by designation of Zetterstedt, Dipt. Scand. ii, p. 816 (1843).

* A generic character according to Verrall.

Head rather wider than thorax; eyes bare, contiguous in ♂; frons in ♂ often inflated, with a depression in the centre, in ♀ broad, with "transverse furrows which run from the sides towards a vague middle longitudinal channel which is smooth and is bounded on each side by a linear groove" (*Verrall*). Face differing slightly in the sexes; in ♂ central knob more distinct and upper mouth-border less produced, in ♀ central knob often absent but upper mouth-border very prominent. Antennæ short, 3rd joint rounded (less so in subgenus *Orthoneura*); arista bare, nearly basal. *Thorax* subquadrate, scutellum normal, both with short soft pubescence. *Abdomen* rather short, oval, flattened, side margins rounded, usually metallic. *Legs* simple, moderately strong. *Wings* somewhat as in *Syrphus*, but the last section of the 4th vein strongly recurrent and often sinuous; 1st posterior and discal cells and anal cells somewhat shortened; anterior cross-vein distinctly before middle of discal cell.

Life-history unknown, but two European species have been bred from larvæ found in the mud of a ditch.

This genus has been split up and reformed more than once, the groups *Liogaster* and *Orthoneura* being regarded by some as good genera, by others as subgenera only. The former is characterised by the widely separated eyes in the ♂, the latter by the strongly recurrent tip of the 4th vein and the elongate 3rd antennal joint. In *Chrysogaster*, *sens. str.*, the vein is not recurrent and the 3rd antennal joint is short and subquadrate. Other subgenera have been set up which need not be considered here.

Only one species of this group is Indian; it falls into *Orthoneura*.

Subgenus **ORTHONEURA**, *Macq.*

Differing from *Chrysogaster*, *sens. str.*, by the recurrent 4th vein and elongate 3rd antennal joint (though these characters do not always appear in the same species). Only one Indian species is known.

Range. Europe, Asia Minor, Siberia, India, Aru Islands, North America, Brazil.

33. Chrysogaster (Orthoneura) indica, *Brun.*

Chrysogaster (*Orthoneura*) *indica*, Brunetti, Rec. Ind. Mus. xi, p. 203 (1915).

♂. *Head*: vertex very small, with a little dark brown hair; eyes contiguous for a moderate space, about half the height of the frons, dark brown, bare; frons shining blue-black, with light brown or greyish hairs; antennal prominence slight; face shining blue-black with a little whitish hair, mouth-border well produced. Proboscis and palpi blackish-brown. Antennæ rather dark brown, 3rd joint ovate; arista almost basal. Occiput blackish, not at all

produced beyond upper half of eye and only slightly so on lower half, which bears a fringe of white hairs. *Thorax* cupreous, with brownish or yellowish hairs; scutellum æneous, similarly pubescent; sides of thorax cupreous, with a little greyish hair. *Abdomen* cupreous, with moderately thick soft whitish pubescence, which is thicker at the sides and on the belly. *Legs* wholly black,

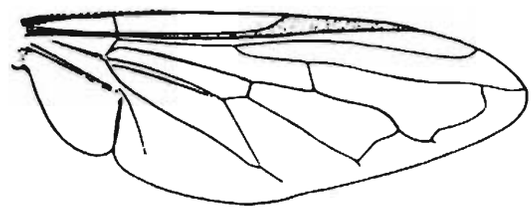

Fig. 10.—*Chrysogaster* (*Orthoneura*) *indica*, Brun., wing.

with the usual amount of greyish pubescence, under sides of tarsi reddish-brown. *Wings* pale grey; stigma yellowish; halteres orange.

Length, 6 mm.

Described from a unique ♂ in the Indian Museum, from the Kangra Valley, Punjab, 4500 ft., xi. 1909 (*Dudgeon*).

Genus **CHILOSIA**, *Meig.*

Cheilosia, Meigen, Syst. Beschr. iii, p. 296 (1822), and vii, p. 123 (1838).
Eristalis, Zetterstedt, Fallen, et auct.
Lejota, Rondani, Dipt. Ital. Prod. ii, p. 176, *nota* (1857).
Cartosyrphus, Bigot, Ann. Soc. Ent. France, (6) iii, p. 230 (1883).

GENOTYPE, *Syrphus flavipes*, Panz.; as *depila*, sp. nov.*

Head about as broad as thorax; eyes contiguous in ♂ for a considerable space (with one or two exceptions), broadly separated in ♀, ranging from densely pubescent to absolutely bare, always more hairy in ♂ than ♀ except in a limited group of species in which the reverse is the case; frontal triangle in ♂ small, frons in ♀ usually with three longitudinal channels and a more or less distinct transverse depression just above the antennæ; face excavated below antennæ and then produced into a distinct central bump, being hollowed again before the produced mouth-border. A peculiar generic feature is the slightly raised eye-margins extending along the lower inner orbit of the eyes, bearing a different pubescence from that of the face, the latter being little more than tomentum except in certain species. Antennæ with

* Some little uncertainty seems attached to the exact origin, application and genotype of the name *Chilosia* according to Verrall. Coquillet's designation of a type-species is adopted here.

3rd joint ovate, but varying to circular, oblong or angular; arista dorsal, bare or slightly pubescent, nearly basal. *Thorax* squarish or oblong, broader across the middle, the distinct pubescence more bristly towards sides, scutellum normal. *Abdomen* oblong or elongate-oval, sometimes short, generally longer than thorax; segments subequal except the very short ultimate one; genitalia small. *Legs* simple, but sometimes providing specific characters.

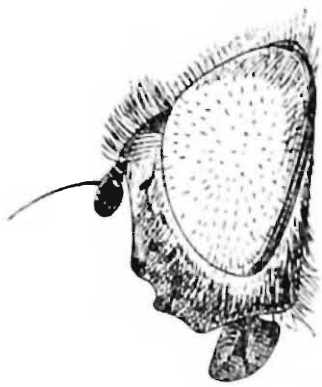

Fig. 11.—*Chilosia* sp., head in profile, proboscis retracted.

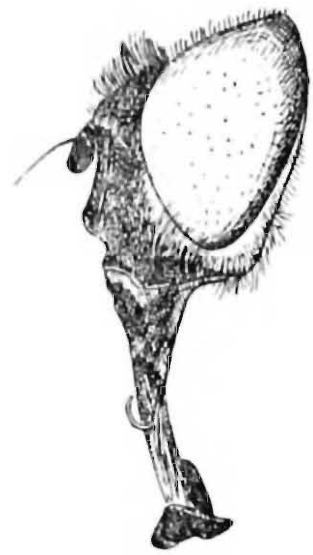

Fig. 12.— *Chilosia* sp., head in profile, proboscis extended.

Wings as in *Syrphus*, in life folded over abdomen or slightly expanded; squamæ with long fringe.

Life-history. Larvæ reputed to live in fungi, and the stems and roots of plants.

Range. Europe, North Africa, Gaboon, Asia, Tasmania, North America.

Chilosia consists of moderate-sized, rather shining, blackish flies frequenting bushes and undergrowth, rather sluggish in habits but with a quick flight.

Table of Species.

1.	Wing-tip broadly brownish	2.
	Wings uniformly pale grey	3.
2.	Tibiæ with narrow black median ring, more or less indistinct on front pair: length 7½ mm.	*apicalis*, Brun., p. 43.
	Tibiæ without such band: length 11 mm	*pilipes*, Big., p. 43.
3.	Abdomen shining plumbeous, with transverse black bands	[p. 44. *plumbiventris*, Brun.,
	Abdomen black, with plumbeous tinge	4.
4.	Third abdominal segment with black hairs only; remaining segments with yellow pubescence	[p. 45. *hirticincta*, Brun.,
	Abdominal pubescence wholly yellowish-grey.	*nigroænea*, Brun., [p. 45.

The eyes are pubescent in all the above species.

34. **Chilosia apicalis**, *Brun.*

Chilosia apicalis, Brunetti, Rec. Ind. Mus. viii, p. 158 (1913).

♀ *Head*: eyes with grey pubescence; the frons at just above the antennæ, nearly one-third the width of the head, narrowing to the vertex, where it is only two-thirds as wide; whole head æneous, with darker and with greyish reflections: vertex and frons with black hairs, also the large transverse callosity just above the antennæ, which reaches from eye to eye and is rather impressed in its middle; facial bump moderately projecting, with a little yellowish-grey hair on each side of the mouth-opening. Proboscis blackish, with large reddish-brown labella. Under side of head with a little white hair. Antennæ reddish-brown, upper side and tip of 3rd joint blackish; posterior orbit of eyes with white hair on lower half. *Thorax* æneous, with a very slight bronze-green tint viewed in certain directions, with short black and yellow hairs. Scutellum concolorous; black hairs on dorsum, with some yellow ones intermixed, yellow hair only on under side, softer and closer; hind border with at least six long black bristles; a few inconspicuous black bristles behind wings; pleuræ with light yellowish hair. *Abdomen* with 1st segment brownish, remainder dull black, with yellowish hairs which are thicker towards base and sides; venter similar, nearly bare. *Legs*: coxæ black, a little reddish-brown about trochanters: femora black except narrowly yellowish at tips; tibiæ orange, a rather narrow median band, which is narrower and incomplete on anterior legs and broader and complete on hind legs: tarsi orange, tips brown; hind tarsi with whole upper side dark. *Wings* nearly clear; stigma brownish-yellow, extending to tip of cell, a blackish infuscation over apical third of wing, extending from stigma posteriorly to about hind margin of 1st posterior cell; halteres dirty yellow.

Length, 7½ mm.

Described from a single ♀ from Rotung, N.E. Frontier of India, 1400 ft., 4–13. iii. 1912 (*Kemp*). In the Indian Museum.

35. **Chilosia pilipes**, *Big.*

Cartosyrphus pilipes, Bigot, Ann. Soc. Ent. France, (6) iv, p. 551 (1884).

"Bronze-black, bare, abdomen darker. Antennæ tawny, face and frons bare, shining black; eyes pubescent. *Thorax* with traces of four grey stripes; squamæ and halteres dull testaceous; scutellum fringed with yellow hairs. Femora black, knees and tibiæ pale tawny, latter without a black ring; tarsi concolorous, with the last segments a little brownish about the middle. *Wings* pale grey, tips broadly pale brownish. India. One specimen."

Length, 11 mm.

Type in Bigot collection.

36. Chilosia plumbiventris, *Brun.*

Chilosia plumbiventris, Brunetti, Rec. Ind. Mus. xi, p. 205 (1915).

♀. *Head*: frons and face shining æneous-black, almost with a deep indigo tinge, the frons widening gradually from vertex to about one-third the width of the head above the antennæ; frons slightly prominent above the antennæ from eye to eye, giving the appearance of an elongate transverse callus; above this callus-like prominence is an oval, yellowish-grey dust spot on each side touching the eye-margins; frons, except the dust spots, wholly covered with thick black hairs; face shining black, the central knob large and prominent, the mouth-border but slightly produced, very narrowly orange; a little almost microscopic pubescence at the sides of the mouth, but not extending just below the eyes. Eye-margins distinct, grey, widened immediately below antennal prominence, and on this wider part on each side of the face are three elongate notches as though impressed with a knife. Vertical margin, occiput and lower part of head æneous-black, but the facial eye-margins are continued narrowly round the eyes to the vertex, bearing a fringe of yellowish-grey hairs, and similarly coloured hairs also cover the lower part of the head below and behind the eyes. Antennæ with first two joints brownish-yellow, 3rd large, broadened, rounded, darker and duskier brown; arista concolorous, bare. *Thorax* dark æneous-black, shining, covered rather closely with very short brownish-yellow pubescence, which, viewed at a low angle from in front, appears uniform and continuous over the whole dorsum, but viewed from behind appears to form three longitudinal stripes, the median one narrowly divided in the middle and attaining the front margin, the exterior ones foreshortened; sides of thorax concolorous, with very sparse and short brownish-yellow hair. Scutellum concolorous, with short brownish-yellow pubescence and a single pair of well separated apical long black bristles. *Abdomen* shining lead-colour with almost microscopic pale yellow pubescence; a dull black broad band, half the length of the segment, on the hind margins of 2nd and 3rd segments, narrowed to a point at the sides of the segment and very slightly notched in the middle in front; these transverse black bands are best seen from behind. *Legs* dark reddish-brown; femora with a moderate amount of pale yellow pubescence; extreme tips of all femora, basal half of all tibiæ, tips of middle tibiæ and first three joints of middle tarsi, brownish-yellow, the posterior margins of these three joints blackish. Under sides of fore and hind tarsi with golden-brown pubescence. *Wings* very pale grey; stigma pale yellow; halteres bright orange.

Length, 8 mm.

Described from a single ♀ in the Indian Museum from Simla, 7. v. 1910 (*Annandale*).

The shining lead-colour of the abdomen will easily distinguish this species.

37 Chilosia hirticincta, *Brun.*

Chilosia hirticincta, Brunetti, Rec. Ind. Mus. xi, p. 204 (1915).

♂. *Head*: eyes covered with dense brownish-yellow pubescence, touching for a considerable space, leaving a very small vertical triangle, blackish, with three or four long black hairs intermixed with the long brownish-yellow ones. Frons sharply demarcated from face, very convex, æneous-blackish, with only a very narrow grey-dusted eye-border and an indistinct median similar line; the whole frons covered with long black hair. Face moderately prominent, central bump small, mouth-border not very prominent, extremely narrowly orange; the face blackish, with very short, almost microscopic pubescence. Eye-margins greyish, with long yellowish-grey hair. Occiput and lower part of head grey, with yellowish-grey hairs. Proboscis black. Antennæ with first two joints black, 3rd black, with, visible in certain lights, a greyish dust; rounded, but with rather truncate tip; arista bare, black; the depression in which the antennæ are set, brownish-yellow. *Thorax* and scutellum shining æneous, with rather long and thick brownish-yellow hair with which some black hair is intermixed. No stiff bristly hairs on either thorax or scutellum. Sides of thorax cinereous-grey (the colour extending almost over the shoulders), with rather long brownish-yellow hair. *Abdomen* æneous-black, shining, with long yellowish hair; the third segment with all the hairs on the dorsum black. *Legs*: femora blackish with long yellowish hair, extreme tips orange. Tibiæ black, the base broadly, the tips less broadly, orange or brownish-yellow; with yellow or golden-yellow short pubescence on front side of front pair. Tarsi blackish above, with a little yellowish-brown hair, under side with rich golden-brown or golden-yellow close pubescence, the first two joints of the middle pale brownish-yellow. *Wings* pale grey, a little yellowish on basal half anteriorly, in one specimen slightly yellowish in the neighbourhood of the veins. Halteres and tegulæ brownish-yellow.

Length, 9–10 mm.

Described from three ♂ ♂ in the Indian Museum from the Darjiling District (*Lynch*).

This species is easily known by the conspicuous, wholly black-haired 3rd abdominal segment.

38. Chilosia nigroænea, *Brun.*

Chilosia nigroænea, Brunetti, Rec. Ind. Mus. xi, p. 204 (1915).

♂ ♀ *Head*: eyes in ♂ contiguous for about one-third of the distance from extreme vertex to root of antennæ, vertical triangle blackish, with some long black hairs. Eyes with rather thick, short yellowish-grey pubescence, which when viewed from certain directions appears quite white: frons as in *hirticincta*, dust on eye-margins less distinct; face with central knob somewhat large, conspicuous and rounded, æneous-black, shining, with very

sparse, almost microscopic greyish pubescence; central knob and space immediately below it very shining black; mouth-border narrowly orange, moderately produced, with a small bump on each side of it; eye-margins dull blackish, with sparse, rather short greyish hairs: occiput grey, with short greyish hairs. Antennæ dull dirty brownish-grey; arista bare, black. In ♀, frons not much narrowed on vertex; about one-third width of head just above antennæ is shining black with a little grey pubescence. *Thorax* and scutellum shining black, with rather thick brownish-yellow pubescence, a few black bristly hairs intermixed in front of wings, and on hind margin of scutellum, where these black hairs are much longer than the general pubescence; sides moderately dark shining greyish, with yellowish-grey hair. *Abdomen* all shining black, with close, pale yellowish-grey pubescence; venter similar. *Legs* blackish, with pale yellowish-grey pubescence; extreme tips of femora, base of tibiæ rather narrowly in ♂ and to the extent of basal third in ♀, brownish-yellow; tarsi blackish, with pale hairs above and thick rich golden-brown or golden-yellow pubescence below; base of middle tarsi above more or less brownish-yellow. *Wings* very pale grey, ♂, practically clear, ♀; stigma pale yellow; halteres yellowish.

Length, ♂ 7, ♀ 6 mm.

Described from a single ♂, Matiana, and ♀, Simla, 7. v. 1910, in the Indian Museum (both *Annandale*).

N.B. Various other species of *Chilosia* are Indian, but are mostly represented by uniques or indifferently preserved specimens, so that in such a critical genus it would be worse than folly to set them up as new. *C. grossa*, Fallen, was recorded by me* with a doubt from two specimens in the Forest Zoologist's collection from the Western Himalayas (Binsor, Kumaon District, 28. v. 1912, ♂ ♀ [*Imms*]), but no further specimens have come before me, and the various discrepancies from normal *grossa* suggest that the identification of the species requires further confirmation.

Genus **MELANOSTOMA**, *Sch.*

Melanostoma, Schiner, Wien. Ent. Monats. iv, p. 213 (1860).
Plesia, Macquart, Dipt. Exot. Supp. 4, p. 156 (1849).
Psylogaster, Lioy, Atti Isti. Veneto, (3) ix, p. 753 (1864).

GENOTYPE, *Musca mellina*, L.; by original designation.

Differing from *Syrphus* by the entire absence of pale markings on face, thorax and scutellum; from *Platychirus* by the front tarsi in the ♂ not being dilated, and from *Chilosia* by the absence of eye-margins. These distinctions are sufficient to understand the Oriental species, but there are one or two European genera very closely allied. The exact limits of the genus are not

* Rec. Ind. Mus. xi, p. 206 (1915).

well-defined, though the species appear to form a natural group. Eyes bare, contiguous in ♂; arista bare or very slightly pubescent. *Abdomen* elongate-oblong or sometimes long-ovate, narrowed towards tip, sides usually parallel; middle segments generally with pairs of yellowish spots, sometimes bluish or absent. Pubescence of whole body soft and moderate in quantity. *Wings* etc. as in *Syrphus*.

Life-history unknown.

Range. Europe, Asia, India, Orient, North and South Africa, Australia, New Zealand, North and Central America.

Table of Species.

1. Abdominal spots yellow or orange ..	2.
Abdominal spots (♂) grey, yellowish-grey or (♀) bluish	*ambiguum*, Fln., p. 47.
2. Face in profile with two distinct small bumps	*orientale*, Wied., p. 48.
Face in profile forming a single angle only, being nearly straight above and below this point .	[p. 50. *univittatum*, Wied.,

Syrphus pedius, Walk., is a *Melanostoma*, with *S. cothonea*, Walk., as a synonym, but the descriptions of both are too meagre to identify the form with any degree of certainty. Mr. Edwards is my kind informant as to the generic position of the species, which may be synonymous with one of those admitted here.

39. **Melanostoma ambiguum**, *Fln.*

Scæva ambiguum, Fallén, Dipt. Suec. Syrph. p. 47 (1817).
Melanostoma ambiguum, Verrall, Brit. Flies, viii, p. 304 (1901).
Syrphus monochætum, Loew, Beschr. Eur. Dipt. ii, p. 2 (1871).
Scæva hyperboreum, Holmgren, Öfvers. Kongl. Vet.-Akad. Forhandl. xx, p. 100 (1872).

♂. *Head*: vertical triangle equilateral, of moderate size, elevated, black with long brown pubescence; eyes closely contiguous for a distance equal to length of vertical triangle: frons blue-black, moderately shining with long brown pubescence: face well produced, moderately shining æneous, covered with yellowish-grey dust except on the shining black moderately large central bump and tip of mouth-opening. *Antennæ* blackish-brown, under side of 3rd joint more or less orange. Occipital margin light grey with yellowish-white fringe. *Thorax* and scutellum æneous with brownish pubescence; sides grey-dusted with greyish pubescence. *Abdomen* black, 1st segment dark brown, 2nd orange-brown, anterior corners slightly æneous, the colour running narrowly along side margins; a small triangular grey tomentose spot on each side margin just below middle; an elongate grey tomentose spot with rounded inner end placed diagonally on each side of 3rd and 4th segments, well below anterior margin

and reaching side margin, the spots well separated. Pubescence of abdomen whitish, sparse on dorsum but longer at sides, especially on basal half; microscopic black pubescence on black parts. Genitalia shining blue-black. Venter indistinctly brownish-yellow with indefinite blackish marks. *Legs* mainly black, coxæ with a little grey pubescence; fore femora except narrowly below, middle pair on about apical half, hind pair narrowly at tip, anterior tibiæ for nearly basal half, hind pair narrowly at base, orange. Fore femora on outer side with long black hairs, also with the peculiar, curved long hair near tip and three long yellow thin bristles on under side, characteristic of the species (*teste* Verrall); fore tibiæ with very short sparse pale pubescence and some long pale hairs on outer side; middle femora with rather long yellowish pubescence behind and a single yellow bristle on under side before middle; middle tibiæ with a few long black hairs on hinder side on apical half; hind femora with long yellowish or whitish pubescence on outer and under sides; hind tibiæ with some pale pubescence and longer hairs; hind metatarsi considerably incrassate. *Wings* practically clear; stigma very pale yellow; halteres orange.

Length, 9 mm.

Described from a single ♂ in the Indian Museum from Matiana, Simla District, 8000 ft. Widely spread in Europe.

There can be no doubt of the identity of this species (although this description does not quite agree with Verrall's description of British specimens), as the peculiar, curved single hair towards the tip of the front femora, in conjunction with the equally unusual yellow thin bristles below the front and middle femora, infallibly distinguish it from all others except *dubium*, Zett., which differs however in the abdominal markings and otherwise. A comparison with the British specimens in the British Museum confirms the identification, the Indian ♂ being slightly larger in size. *M. ambiguum* very closely resembles the ♂ of *Platychirus albimanus*, but is known by the undilated front tibiæ.

M. dubium, Zett., was recently recorded by me from the Simla District *, but a more detailed examination proved the specimen to be only a melanoid *Platychirus albimanus*.

40. **Melanostoma orientale**, *Wied.* (Pl. I, fig. 14.)

Syrphus orientalis, Wiedemann, Analec. Ent. p. 36 (1824); id., Auss. Zweifl. ii, p. 139 (1830).

Melanostoma orientale, de Meijere, Tijd .v. Ent. li, p. 312 (1908); liv, p. 347 (1911); Brunetti, Rec. Ind. Mus. xi, p. 207, pl. xiii, fig. 2, head in profile (1915); xiii, p. 85 (1917).

♂ ♀. *Head*: eyes in ♂ bare, closely contiguous for half or a little more than half the distance from extreme vertical margin to upper angle of frons; lower facets barely appreciably smaller

* Rec. Ind. Mus. xi, p. 207 (1915).

than upper ones; distance from upper angle of frons to the well-defined slightly ridged anterior margin a little greater than that of ocular contiguity; vertical triangle and frons shining æneous-black with black or brown hairs; face and lower part of head æneous, all grey-dusted except the small central bump and moderately produced upper mouth-edge. Antennæ blackish, under side of 3rd joint to a greater or less extent brownish-orange, sometimes that of 2nd joint also; arista microscopically pubescent. Occiput grey, the colour narrowly visible behind eyes in profile; occipital margin with yellowish-brown hairs behind vertex, and a fringe below of short whitish hairs. Proboscis blackish. In ♀, frons almost exactly one-third of head at level of antennæ, a little narrowed above; at about the middle at each side of frons, contiguous to eyes, a subtriangular grey or yellowish-grey dusted spot of varying size, sometimes large enough nearly or quite to meet the other in the middle line; sides of face similarly grey-dusted, leaving central bump and upper mouth-edge rather more broadly bare than in ♂. *Thorax* and scutellum all

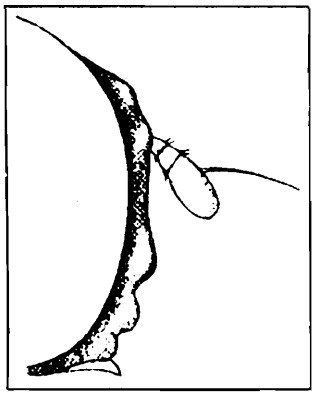

Fig. 13.—*Melanostoma orientale*, Wied., frons and face in profile.

shining æneous, with soft yellowish to greyish or brownish-grey pubescence. *Abdomen* moderately shining black, 1st segment and anterior corners of 2nd a little more shining; 2nd segment in ♂ with a pair of orange-yellow spots, rounded on inner sides, placed a little below the middle of side margins of segments; 3rd and 4th segments with a pair of large quadrate to oblong orange-yellow spots, placed on side margins and attaining anterior border but well clear of hind border; inner sides of these spots straight, and separated from each other by a moderately broad median space; 5th segment wholly æneous. In ♀, spots on 2nd segment often elongate and diagonally placed, or reduced or indistinct; those on 3rd and 4th segments subtriangular, placed on anterior margin, the inner side straight, the third or outer side often slightly sinuate; 5th segment with a pair of narrow spots on anterior corners, well separated. Pubescence of abdomen in ♂ and ♀ from yellowish-grey to whitish, soft and longer at sides. Venter black, with some pale marks somewhat corresponding with those of dorsum,

sometimes wholly absent. *Legs* orange; ♂ with about basal half of anterior femora, and hind femora wholly (except narrowly at tips and sometimes very narrowly at base), black; a broad median blackish band on hind tibiæ filling greater part of limb; upper side of hind tarsi and anterior tarsi more or less towards tips, brownish. Pubescence of femora whitish, very sparse on tibiæ, and, with that of tarsi, more yellowish. In ♀, legs all orange; an indefinite brownish median band on hind tibiæ and upper side of tarsi towards tips; sometimes hind legs marked as in ♂. *Wings* pale yellowish-grey; stigma more yellow; halteres brownish-orange.

Length, 5–7 mm.

Described from a good number of specimens from various sources. Peshawur, v.1916 (*Fletcher*); Simla (var. locs.); Naini Tal; Darjiling; Kurseong; Bengal; Khasi Hills; Assam; Assam–Bhutan Frontier; Abor Country. Dr. de Meijere records several specimens from Pattipola, Ceylon, 2000 metres. Apparently the commonest and most widely distributed species of the genus in the East, occurring throughout all the warm weather in the plains and hills. I am still undecided whether *orientale* is specifically distinct from the common European *mellinum* (*v.* my notes, Rec. Ind. Mus. xi, p. 207).

Type in Copenhagen Museum (*teste* Wiedemann).

41. **Melanostoma univittatum**, *Wied.*

Syrphus univittatus, Wiedemann, Analec. Entom. p. 36 (1824); id., Auss. Zweifl. ii, p. 139 (1830).
Melanostoma univittatum, Brunetti, Rec. Ind. Mus. xi, p. 208, pl. xiii, figs. 4–6, head in profile, abdomen ♂ ♀ (1915).
Syrphus planifacies, Macquart, Dipt. Exot. Supp. 3, p. 43 (1848).
Syrphus cyathiger, Walker, Proc. Linn. Soc. Lond. i, p. 125 (1857); Bigot, Ann. Soc. Ent. France, (6) iv, p. 86 (1884).
Melanostoma planifacies, de Meijere, Tijd. v. Ent. li, p. 313 (1908); liv, p. 346 (1911).

♂ ♀ *Head* in ♂: vertical triangle equilateral, a little elevated, dark grey with blackish hairs; frons and face greenish-æneous, both with yellowish-grey dust and a little pale yellowish pubescence; face with outline in profile nearly perpendicular. Antennæ orange, tip of 3rd joint more or less blackish, arista orange at base. Proboscis yellowish. Occiput blackish-grey, lighter grey towards margin, which bears a slight fringe of pale yellow hairs. In ♀, frons and face enclosed by two straight lines, diverging slightly downwards, forming one-third of head at level of antennæ, both moderately shining black with grey dust, which is less thick in the median space just below vertex and almost absent just above antennæ; frons and face with thin yellowish-grey pubescence. *Thorax* and scutellum æneous-black, sometimes with greenish or cupreous tinge; humeral region with a little yellowish-grey dust;

pleuræ æneous, more or less yellowish-grey dusted; whole thorax with sparse yellowish-grey pubescence. *Abdomen* orange; 1st segment black; a narrow black hind margin to 2nd, 3rd and 4th segments in ♂, which in the ♀ is widened at sides up to about middle of side margin (resembling *Melanostoma mellinum*, F., though rather less conspicuous); a narrow median black stripe, sometimes indistinct, on 2nd and 3rd segments in ♂, on 4th also in ♀; 5th segment in ♀ a small replica of 4th. A peculiar feature in the ♀ is the presence of two large whitish spots, placed side by side, covering the 1st and 2nd segments and encroaching on the 3rd, through which the ordinary markings of the 2nd segment can be seen, these spots being sometimes absent or very faint. Genitalia in ♂ large, shining black, knob-like. Pubescence of abdomen sparse, pale yellow. Venter dull orange with indefinite blackish marks. *Legs*: coxæ blackish with grey dust; hind tibiæ

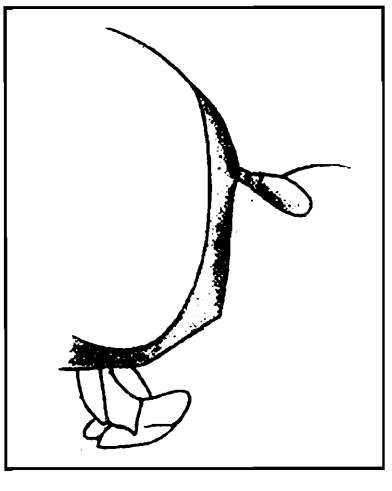

Fig. 14.—*Melanostoma univittatum*, Wied., frons and face in profile.

indistinctly blackish about middle; pubescence of legs pale yellow, black on blackish part of hind tibiæ. *Wings* yellowish-grey; stigma barely appreciably darker; halteres orange.

Length, 5–6 mm.

Described from a number of both sexes in the Indian Museum, Pusa and other collections. Darjiling, 5900 ft. (*Brunetti*); Katmandu, Nepal; Bhim Tal, 4450 ft.; Pusa, not uncommon, i., ii., iii., xii.; Chapra, Bengal; Coorg, S. India, 15–20. x. 1915 (*Fletcher*); Bangalore, 3000 ft.; Coromandel, 2500 ft.; Nedumangad, Travancore (*Annandale*); Sadiya, Assam; Shillong, 5000 ft., x. 1916 (*Fletcher*); Lower Burma; Mergui; Dibrugarh, 17–19. xi. 1911 (*Kemp*); Sarawak (*Beebe*). De Meijere records *planifacies* ♀ from Singapore, Ceylon, Sumatra and Queensland, but no ♂.

Three ♀ ♀ (one headless) in the Indian Museum, named *planifacies*, Macq., by Bigot, are only rather small specimens of *univittatum*; they come from Dehra Dun.

Type in Copenhagen Museum (*teste* Wiedemann).

42. Melanostoma pedium, *Walk.*

Syrphus pedius, Walker, Ins. Saund., Dipt. pt. 3, p. 234 (1852).
Syrphus cothonea, id., op. cit., p. 235 (1852).

♂. "Metallic green; face mostly adorned with a pale tawny covering; eyes red; suckers and feelers ferruginous; chest clothed with tawny hairs; abdomen black, much longer but not broader than the chest, slightly widening from the base till near the tip, which is brassy, fringed with pale tawny hairs, adorned with three pairs of large, oblong tawny spots; legs pale tawny; wings tinged with pale tawny; wing-ribs tawny; veins black, tawny towards the base and along the fore border; poisers tawny.

"Length of the body 3 lines; of the wings 6 lines. East Indies."

A species requiring confirmation as to its validity.

Type, ♀, in the British Museum.

Genus **PLATYCHIRUS,** *St. Farg. et Serv.*

Platycheirus, St. Fargeau et Serville, Encycl. Méthod. x, p. 513 (1825).

GENOTYPE, *Syrphus scutatus,* Meig.; by Westwood's designation (1840).

Differing from *Syrphus* principally in the blackish face, which is more or less dusted, without any trace of yellow colouring; eyes bare, contiguous in ♂; antennæ blackish, but under side of 3rd joint sometimes pale; arista bare. *Thorax* and scutellum without trace of yellow markings, pubescence never bristly. *Abdomen* with nearly parallel sides, always with pairs of yellowish (or occasionally bluish) spots. "*Legs* of the ♂ remarkably characteristic, as the base of the front tarsi is always enlarged—whence the name of the genus—and also every part, coxæ, trochanters, femora, tibiæ and tarsi bear individual specific characters in all three pairs of legs; sometimes on the front legs only, sometimes on the anterior legs only, and sometimes on all pairs" (*Verrall*). In the ♀ the legs are simple, except that the front tarsi may be slightly widened. *Wings* etc. as in *Syrphus.*

Life-history. One European species is said to have been bred from rotten fungi; others have been found in the stems of plants and truffles, or bred from larvæ found in flood refuse and other vegetable débris.

Range. Europe, Siberia, Orient, North America, Greenland.

Platychirus may be recognised from *Syrphus* by the absence of any yellow markings on the face or scutellum, from *Melanostoma* by the dilated front tarsi of the ♂, and from *Chilosia* by the yellow abdominal markings and the absence of eye-margins. The species are closely allied, but, if full attention be paid to the specific characters, they may in the majority of cases be deter-

mined with certainty in the ♂ sex; but as melanoid females are by no means uncommon, some specimens of this latter sex are not so easily determinable.

The two Indian species are thus separated:—

Epistome very conspicuously produced to a distance equal to greatest width of eyes in profile, or more; front tarsi in ♂ with first two joints very much dilated, the 1st three times as wide as tip of tibia, and both 1st and 2nd at least three times as wide as the narrow remaining joints; (abdominal spots in ♀ presumably yellow).	[*layensis*, Brun., p. 53. *manicatus*, Meig., var. *hima-*
Epistome only moderately produced, not more than half width of eyes in profile; front tarsi in ♂ at base no wider than tip of tibia, gradually decreasing in width to tip; abdominal spots in ♀ bluish.	*albimanus*, Fabr., p. 54.

43. **Platychirus manicatus**, *Meig.*, var. **himalayensis**, *Brun.* (Pl. I, figs. 11, 12.)

Syrphus manicatus, Meigen, Syst. Beschr. iii, p. 336 (1822).
Platychirus manicatus var. *himalayensis*, Brunetti, Rec. Ind. Mus. xi, p. 209 (1915).
Platychirus manicatus, Verrall, Brit. Flies, viii, p. 266 (1901).

♂ *Head*: eyes contiguous for some little distance, bare; vertical triangle black with a little grey dust and black hairs; frons and face æneous-black, covered with yellowish-grey dust except for the bare, shining black, small, but conspicuous central knob, and immediately above tip of mouth-opening. Frons with black, and face with yellow, pubescence. Antennæ black. Occiput with yellowish-grey dust and a fringe of short hairs which are black on upper part and yellow on rest of margin. *Thorax* æneous-black with a slight greenish tinge; scutellum similar; pubescence of thorax brownish, more blackish on hinder part and also on scutellum; latter with a fringe of yellow hairs dependent from hind margin; sides of thorax with pubescence more yellowish. *Abdomen* black; 1st segment more or less æneous; 2nd, 3rd and 4th each with a pair of orange, subquadrate spots, their inner corners somewhat rounded, placed very near side margins, those on 2nd segment well below anterior margin, those on 3rd and 4th segments touching anterior margin or practically so; an indistinct pair of similar spots on 5th segment; 2nd segment distinctly æneous on anterior corners, the colour blended with the first pair of spots and extending more or less distinctly along sides of segment. Pubescence of abdomen yellow, much longer at sides; some almost microscopic black pubescence on black parts. Venter yellowish, with a little pale pubescence; tip of abdomen shining æneous, with a greenish tinge. *Legs* black; anterior femora broadly, hind pair narrowly, basal half of anterior tibiæ and first

three joints of middle tarsi, all orange; fore tarsi with 1st joint very considerably and conspicuously dilated; 2nd conspicuously but much less dilated; both whitish, with small dark spots on under side; 3rd, 4th, and 5th tarsal joints of normal width. Pubescence of legs mainly pale yellowish; front femora with long brown

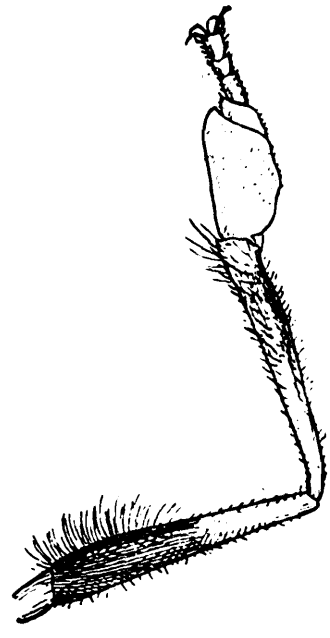

Fig. 15.—*Platychirus manicatus*, Meig., var. *himalayensis*, Brun., right front leg, ♂.

pubescence on outer side, inner side nearly bare; front tibiæ with black pubescence, which is much longer on apical half. Pubescence of hind femora on outer and under sides long and pale, of hind tibiæ very short. *Wings* uniformly pale grey; stigma pale yellowish; halteres dull yellowish.

Length, 9–11 mm.

Described from 3 ♂ ♂ in the Indian Museum from Garhwal, West Himalayas.

44. **Platychirus albimanus**, *Fabr.* (Pl. I, fig. 13.)

Syrphus albimanus, Fabricius, Spec. Ins. ii, p. 434 (1781).
Musca agilitas, Harris, Expos. Engl. Ins. p. 108, pl. xxxii, fig. 45 (1782).
Syrphus cyaneus, Walker, Ins. Brit., Dipt. i, p. 281 (1851).
Platychirus pulchellus, Palma, Ann. Accad. Asp. Nat. Napoli, (3) iii, p. 56, pl. vi, fig. 8 (1863).
Platychirus ciliatus, Bigot, Ann. Soc. Ent. France, (6) iv, p. 74 (1884).
Platychirus albimanus, Verrall, Brit. Flies, viii, p. 280 (1901); Brunetti, Rec. Ind. Mus. xiii, p. 84 (1917).

♂ ♀. *Head*: frons and vertex in ♂ shining black, former slightly dusted, both with black pubescence; face rather well produced*, shining black, not much obscured by greyish dust;

* Verrall says "moderately produced" in ♂; that is, speaking generically.

central bump bare, as is front mouth-edge and space before cheeks; pubescence of face black. Antennæ brownish-black, 3rd joint reddish below (at least in life). Occipital margin with greyish-white pubescence, except behind vertex where it is black. In ♀, upper part of frons shining blue-black; pubescence of face whitish and sparser than in ♂. *Thorax* æneous-black (♂), or shining blue-black (♀), with light brown (♂), or very short pale (♀), pubescence. *Abdomen* in ♂ dull black, with pairs of inconspicuous spots; those on 2nd segment shining yellowish-æneous, nearly filling side margins, well separated; on 3rd segment the spots brownish-yellow, subtriangular, close to basal corners, extending over sides; on 4th segment a similar but more quadrate pair of spots; pubescence of abdomen pale basally, short and black on black parts of 3rd, 4th and 5th segments; genitalia shining æneous with some black hairs. In ♀ with three pairs of shining bluish subquadrate spots, hence practically the abdomen has dull black entire bands connected by a broad dorsal line, the 5th segment almost all shining; sometimes the spots have a slight yellowish tinge. *Legs* in ♂ mainly black; extreme base of fore femora, fore tibiæ except about the middle, fore tarsi except the light brown last joint, middle tibiæ broadly at base narrowly at tip, middle tarsi at base and hind knees narrowly, yellow. Fore femora on hinder side with a long split white hair at extreme base; long, tangled black hairs follow, and then three black hairs, longer still, isolated one from another; middle femora on front side with a row of about eight stiff, short black hairs, and a single long recurrent black hair near tip; hind femora with fairly abundant pale pubescence. Fore tibiæ dilated on apical third, with from one to three long black hairs behind near middle; middle pair with two or three such hairs and some others longer than the ordinary pubescence; hind tibiæ with some black and yellow rather long hairs in front below middle. Front tarsi gradually diminishing in width from base, 1st joint about as wide as tip of tibiæ; hind metatarsi barely dilated. In ♀, anterior femora and basal half of tibiæ mainly dull orange; rest of anterior legs generally darkened; tip of middle tibiæ orange; hind knees rather broadly orange; the legs often paler, especially the middle pair. *Wings* with a faint blackish tinge in ♂, paler in ♀; stigma pale brown; halteres blackish-brown (♂) or orange (♀).

Length, 8–8½ mm.

The above description abbreviated from Verrall*.

Simla, 9. v. 1910; Theog, 27 iv. 1907; Matiana (*Annandale*); Darjiling, 2. x. 1908 (*Brunetti*). The species occurs over all Europe, in Siberia, Faröe Islands, Iceland, and North America.

The ♂ closely resembles *Melanostoma ambiguum*, but is known by the dilated front tibiæ.

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* 'British Flies,' Syrphidæ, p. 280.

Genus **DIDEA**, *Macq.*

Didea, Macquart, Hist. Nat. Dipt. i, p. 508 (1834).

Genotype, *Didea fasciata*, Macq.; by original designation.

Very near *Syrphus*, but differing by the 3rd vein having a distinct downward bend into the 1st posterior cell, somewhat resembling its course in *Eristalis*. Eyes very nearly bare. Antennæ proportionately rather larger. Abdomen quite oval, flattened, broader than thorax, with the extreme margin distinctly raised and black, except where the yellow spots overlap the side margins. In all else practically as in *Syrphus*.

Only one species, which is widely distributed, is Oriental.

Range. Europe, India, Japan, North America.

45. **Didea fasciata**, *Macq.* (Pl. I, fig. 15.)

Didea fasciata, Macquart, Hist. Nat. Dipt. i, p. 508 (1834).

♂ ♀ *Head*: frons dusted with yellowish-grey, often with a large blackish spot above each antenna; pubescence rather long, mainly black; vertex elongate, shining blue-black, with short black pubescence. Eyes slightly pubescent. Antennæ dull blackish, 3rd joint large, twice as long as 1st and 2nd together; arista brown, bare. Face shining yellow, nearly bare of dust, but with rather abundant pale yellow pubescence; front of mouth-border brownish. In ♀, frons at upper part, just below antennæ, considerably more than one-third of head, shining blue-black at vertex; side dust-spots near middle joined to dust of face, leaving a more or less complete black stripe to the large black lunule above the antennæ. *Thorax* shining greenish-black, two rather faint, moderately broad, greyish stripes on anterior part, narrowly separated. Pubescence moderately dense, tawny; longest on side margins and on the whitish-grey pleuræ. Scutellum brownish-yellow with yellow tip seen from above, or orange with blackish basal corners if seen from the side; pubescence tawny, some long, thin black hairs round margin. *Abdomen* black, a pair of large irregularly oval orange spots on 2nd segment, placed rather diagonally from front half of side margin towards middle of hind border, but their inner ends well separated and not attaining hind border; 3rd segment with an orange band placed not quite on front margin, narrowly clear of side margins and well clear of hind margin, its hinder side deeply cut away in middle; 4th segment with a pair of elongate triangles, placed clear of all margins, their apices meeting in the middle line. In ♀, a pair of spots on anterior corners which sometimes meet in the middle line, and the band on the 2nd segment sometimes attaining side margins. Entire margin of abdomen narrowly raised in both sexes; pubescence of margin wholly black except where the side margins are yellow, in which parts it also is yellow; pubescence on disc following ground-colour. Genitalia black, with yellow pubescence.

Legs: coxæ black; anterior femora orange, basal third black, the colour extended a little on middle pair; anterior tarsi black. Hind legs black, except tips of femora narrowly orange. Pubescence black, orange on anterior tibiæ. *Wings* nearly clear, subcostal cell and stigma blackish; 3rd vein considerably looped downward into 1st posterior cell; squamæ pale yellow with deeper margins. Halteres brown, tip of knob orange.

Length, 12 mm.

The above description is abbreviated from Verrall as being likely to be more correct, since his description was drawn up from a number of specimens; whereas only one specimen is available to me, though there is practically no doubt of its identity. The legs are, however, described from the unique Assam specimen, as they show slight differences from Verrall's description; but a ♀ *fasciata* from Austria in the Indian Museum has the legs almost exactly similar.

One ♀ from Shillong, 5000 ft., x. 1916 (*Fletcher*). In the Pusa collection. The Paris Museum possesses what is probably the *type* of the species. It ranges from Central and South Europe to Japan and North America as well as to India.

Genus **DIDEOIDES**, *Brun.*

Dideoides, Brunetti, Rec. Ind. Mus. ii, p. 54 (1908).

Genotype, *D. ovata*, Brun.; the original species.

Allied to *Didea*, Macq., from which it is separated essentially by the 3rd longitudinal vein (cubital, *Verrall*) being nearly straight, as in *Syrphus*, and not dipped, as in *Eristalis*, into the cell below. In other respects it resembles *Didea*, Macq., having a bare arista and the large, flat ovate abdomen in both sexes much wider than the thorax, and bearing the distinct, ridged margin as in that genus.

This genus has appeared to me unstable at times, as the species referred to it form a transition from true *Didea* to *Syrphus*. Theoretically *Didea* should possess the following four characters: a ridged edge to the abdomen, a definitely dipped 3rd vein, bare or nearly bare eyes and all-black antennæ. *D. fasciata* of course possesses them all. I placed *annandalei* in *Didea* because of the quite bare eyes, and disregarded the barely dipped 3rd vein as of minor importance, but if the scope of *Dideoides* be widened to include both bare- and pubescent-eyed species, the genus can include this species.

Didea therefore essentially differs from *Syrphus* (apart from its general facies) in the ridged abdomen and the conspicuously dipped 3rd vein, as the bareness of the eyes and the all-black antennæ appear unreliable characters.

Dideoides differs from *Syrphus* only in the ridged abdomen, and from *Didea* only in the nearly straight 3rd vein. The five species now retained in it are truly congeneric and possess the orthodox facies of *Didea*.

Table of Species.

1. Eyes bare (abdomen black, with 3 pairs of very large yellow spots) . *annandalei*, Brun. [p. 58.
   Eyes densely pubescent .. 2.
2. Abdomen wholly black, except two narrow transverse yellow spots on 2nd segment and a long narrow one on 3rd . . ... *kempi*, sp. n., p. 59.
   Abdomen (nominally) black with *three* transverse yellow bands, of which the 1st may be resolved (specifically or individually) into a pair of transverse elongate spots .. 3.
3 (*a*). Abdominal 2nd segment with a pair of transverse, elongate orange spots, narrowed on inner sides and nearly touching one another. Hind margin of 3rd segment narrowly, of 4th broadly, pale, 5th segment all orange except narrowly black at base. Abdominal pubescence, when seen from the side or behind, very dense and apparently all deep orange, the black pubescence on the black parts of the surface hardly noticeable. .... *ovata*, Brun., p. 60.
3 (*b*). Abdominal 2nd segment with the spots as in *ovata* but narrower, and also again narrowed at each end of each spot. Hind margins of 3rd and 4th segments not appreciably pale, 5th dull brownish-orange. Abdominal pubescence (viewed as in *ovata*) less dense, paler yellow, and the black pubescence as conspicuous as the yellow . . .. [p. 62. *trilineata*, sp. n.,
3 (*c*). Abdominal 2nd segment with a broad yellow band which is (1) very narrowly interrupted in the middle, forming two spots with broad inner ends or, (2) entire, moderately broad but much wider at each end or, (3) filling all the surface except the black hind margin. Hind margins of 3rd and 4th segments respectively narrowly or broadly yellow, 5th segment yellow, narrowly black at base with a transverse small triangular or curved black mark. Abdominal pubescence following ground-colour, but the black much less conspicuous [p. 62. *tigerina*, Big.,

46. Dideoides annandalei, *Brun.*

Didea annandalei, Brunetti, Rec. Ind. Mus. xvi, p. 299, ♂ (1919).

♂ *Head*: frons and face bright chrome-yellow; former with short, stiff black pubescence, latter with softer, pale yellow hairs; antennæ orange, upper side brownish; arista orange; mouth-border brownish. Eyes quite bare; occiput black, entire margin with fringe of whitish hairs; vertex with stiff black hairs; ocelli ruby-red. *Thorax* shining black; dorsum without trace of median grey stripes on anterior margin, wholly with quite whitish pubescence; side margins distinctly yellowish; pleuræ mainly shining black, with whitish pubescence; mesopleura æneous, with

yellowish pubescence. Scutellum wholly rather dull yellow, with all-yellowish pubescence. *Abdomen* with yellow spots as in *D. fasciata*, Macq., except that the 5th segment is wholly orange except at middle of base. Venter yellowish, an indistinct black mark about middle of each segment. *Legs*, except the black coxæ, wholly yellow. *Wings* with 3rd longitudinal vein barely dipped.

Length, 8 mm.

Described from a single ♂ from Nasratabad (Consulate Garden), Seistan.

Type in Indian Museum.

47. **Dideoides kempi**, sp. nov. (Pl. II, fig. 9.)

♂ ♀. *Head*: eyes with dense brownish-yellow pubescence, contiguous for a little greater distance than length of vertical triangle, which is black, with black hairs; frons, face and cheeks with close orange-yellow pile, which is a little more orange on former; pubescence of frons black, of face pale yellow, very inconspicuous; facial bump orange-yellow, bare; mouth-border barely darker; proboscis black. Antennæ black, under side of 1st and 2nd, and base of 3rd joint below, dull orange. Occiput yellowish-grey, with yellow fringe, with which a few black hairs are intermixed behind vertex. In ♀, frons and face widening rapidly downwards, at level of antennæ about one-third width of head, a median, rather wide dark brown stripe from vertex (where it reaches from eye to eye) to antennæ, the frons on each side of it dusted with yellowish-grey, all covered with rather dense black pubescence. *Thorax* greenish-æneous (*type*) or yellowish-æneous; two yellowish-grey median stripes from anterior border to about middle of dorsum; side margins rather orange, but not conspicuously so; sides of thorax yellow-dusted; under side of thorax grey-dusted. Scutellum translucent orange-yellow. Pubescence of dorsum of thorax and on pleuræ bright yellow, of side margins and around wing-base orange; of scutellum yellow with some brown hairs intermixed. *Abdomen* very distinctly marginate; 1st segment æneous with yellowish-grey pubescence, remainder barely shining indigo, hind margins of segments broadly shining deep blue. A pair of elongate-triangular yellow spots lying across middle of 2nd segment, their bases towards but quite clear of side margins, their rounded apices just separated from one another in middle of segment; a narrow, slightly curved yellow band just before middle of 3rd segment, well clear of anterior margin and distinctly clear of side margins. Pubescence of abdomen very short, bristly and black, making the surface appear at first sight almost punctate, except on the yellow spots; 2nd segment with sparse yellowish pubescence over whole surface except behind the yellow spots. Pubescence brownish-yellow on yellow band on 3rd segment. Venter shining black, a pair of large pale yellow spots on 2nd segment and a pale yellow broad basal band on 3rd segment. *Legs*: coxæ, nearly all the

basal half of anterior femora and more than basal half of hind pair, more than apical half of hind tibiæ and all tarsi, wholly black; remainder of legs orange. Pubescence mainly orange-yellow, but black on black parts of femora, and a fringe of tiny black bristles down hinder side of hind tibiæ and also on apical half on inner side. *Wings* distinctly yellowish; stigma darker; squamæ and halteres orange.

Length, 14 mm.

Described from two ♂ ♂ in the Indian Museum. Above Tura, Garo Hills, Assam, 3500–3900 ft., ix. 1917 (*Mrs. Kemp*). A very striking and handsome species. Two ♀ ♀ and a headless specimen from the lower ranges, Khasi Hills, 1878 (*Chennell*), in the British Museum.

48. **Dideoides ovata**, *Brun.* (Pl. I, figs. 16, 17.)

Dideoides ovata, Brunetti, Rec. Ind. Mus. ii, p. 54 (figs., abd. ♂ ♀) (1908).

♂ ♀ *Head*, ♂: face moderately produced above mouth and just below the antennæ; in depth descending only a little below eyes; face and frons bright yellow, with moderately thick yellow hair, which above the antennæ is replaced by black hairs. Eyes touching for half the distance from top of frons to the triangular-elongated vertex, which is black with black hairs and prominent reddish ocelli; eyes with close grey pubescence. Antennæ reddish-brown, situated on a tawny (darker on upper side) protuberance; 3rd joint of antennæ darker on upper side, arista orange, bare; mouth and proboscis black, latter with some grey hair at tip; back of head greenish-grey; posterior orbit of eyes with a thick fringe of short bright yellow hair, of equal length all round. In ♀, frons with a broad greenish-black stripe from vertex down to and enclosing upper part of antennal protuberance, the black hairs being thicker than in the ♂ Antennæ nearly all black except under side of first two joints, and under side of 3rd at base; arista more brownish than in the ♂; pubescence of eyes almost yellowish, especially on lower part; rest as in ♂. *Thorax*: dorsum dull greenish-æneous with three central, narrow, well-separated, not very distinct brownish lines reaching from anterior nearly to posterior margin; sides concolorous, rather darker behind; with a broad yellow vertical stripe just in front of wing, descending to and terminating on the sternopleura, this stripe bearing a rather thick fringe of bright yellow hair. In ♀ all the pleuræ dull greenish-yellow, and the pubescence is rather more abundant. Dorsum covered with soft short yellow hair, which round the wing-insertion is bright orange. Posterior corners of dorsal surface of thorax forming on each side an orange elongated callosity with bright orange-brown hair. Scutellum rather dull orange-yellow, covered with soft black hairs. Metanotum black. *Abdomen* black, with an unbroken, deep brown raised edge around the entire dorsal surface, closely beset with

very short bristles; 1st segment greenish-black, sub-metallic, very short; 2nd segment æneous at base, with two elongated orange spots, placed transversely, forming a band, interrupted in the centre; this band being enlarged at the ends (foreshortened in front) in the ♂, and contracted at the ends and barely attaining the ridged edges of the segment in the ♀; a bunch of yellow hairs on the shoulders of this segment in both sexes; 3rd segment with a transverse orange band across centre, anterior edge slightly convex forward, posterior edge forming two straight lines narrowing the band in its centre and leaving the remainder of the segment as a flattened black triangle, the extreme posterior edge being sub-metallic dark brown with a fringe of very short black hairs; the sides of this orange cross-band are parallel with the sides of the abdomen, to the ridges of which they extend. On 4th segment a similar, but rather narrower and slightly more arched band, with a second orange band (as a flattened triangle, sub-metallic posteriorly) on posterior part of segment, the extreme edge of which is sub-metallic brassy, with a fringe of longish yellowish hair. The ♀ shows no trace of the sub-metallic tinge. 5th segment orange, with black at the base in some ♂ specimens; yellow-haired. The whole abdomen with yellow hairs on the yellowish parts (longest towards the tip), and shorter, black hairs on the black parts. Genitalia: in the ♂ rather prominent, orange, with some short black hairs; in the ♀ small, elongated, dark-coloured. Venter in ♂ black, with narrow yellowish bands at the juncture of the segments, widest on border of 2nd. In ♀ black, with two semi-circular large yellow spots at base of the 2nd, 3rd and 4th segments; posterior border of 1st widely, of 3rd narrowly, and of 2nd very narrowly (with enlargements at the corners), yellow. Venter nearly bare, a little short yellow sparse hair. *Legs*: coxæ and base of femora black with some short black hair; remainder of legs entirely orange-yellow, the upper sides of the tarsi being a little browner. The anterior femora bear a little pale hair on their under side, but the black hairs on the hind pair extend almost to the tip below, the upper apical part being bare. All the tibiæ bear very short golden-yellow pubescence, the hind pair having a row of short black bristles on the outer side. *Wings* pale yellowish-grey, slightly tawny on the basal and anterior parts. Halteres orange. Tegulæ bright orange-yellow with concolorous fringe.

Length, 12–16 mm.

Described from four ♂♂ and two ♀♀ (one, a melanoid ♀ described below) all from Sikkim and in the Indian Museum collection in good condition. Darjiling, 1000–3000 ft. (*Lord Carmichael*); Shillong, 4900 ft. (*Kemp*).

The melanoid ♀ has the antennæ almost wholly black (one of the alleged characters of *Didea*), the abdomen black with a dark blue sub-metallic reflection, beset with short black hairs; 2nd segment with two transverse narrow yellowish spots and forming

a band reaching the ridged side margins. Venter black, with two pale yellow spots at base of 2nd, 3rd and 4th segments, resembling those of the typical form; hind margins of segments narrowly yellow, with a tendency to spread to the 2nd segment.

49. **Dideoides trilineata**, sp. nov.

♂ Very near *D. ovata*. The three dark lines on the thorax distinct. The elongate spots on the 2nd abdominal segment narrower and pointed at each end. Hind margins of 3rd and 4th segments not obviously pale. Pubescence of abdomen rather pale yellow, not orange, distinctly less conspicuous than in *ovata*, but the black pubescence as conspicuous as the yellow. Edges of abdomen wholly black. Rest as in *D. ovata*.

One ♂, British Museum. Myitkyina District, Upper Burma, 6. xi. 1907 (*Capt. Whitmore*).

50. **Dideoides tigerina**, *Big.*

Ischyrosyrphus tigerinus, Bigot, Ann. Soc. Ent. France, (6) v, p. 249 (1885).

♂ ♀ Very near both *ovata* and *trilineata*. Thorax æneous, a little more yellowish in the ♂, greenish in the ♀; the three longitudinal dark stripes as in both those species, perhaps somewhat less distinct. 1st abdominal band normally entire, though in one ♂ it is just visibly interrupted in the middle; in some specimens so broad as to fill all the surface except the rather broad black hind margin. 2nd and 3rd abdominal bands as in *ovata*, but rather broader and more yellowish than orange. Edges of abdomen black, with long pale yellow pubescence only at sides of 2nd segment, that on remainder of margins black, with a few yellow hairs intermixed in places. Pubescence of dorsum of abdomen yellow, conspicuous, but less dense than in *ovata*, and the black pubescence on the black parts short and less noticeable than in *trilineata*. Facial stripe sometimes less conspicuous, and antennæ wholly black except for a slight paleness at base of 3rd joint. Femora entirely yellow except in one ♂, in which about the basal half is pale. Rest as in *ovata*.

A short series of both sexes in the British Museum. Lower ranges, Khasi Hills, Assam, 1878 (*Chennell*). Their identification with Bigot's type ♂ is certain, from a close comparison.

Type in Bigot collection.

Both of the two latter species appear distinct, although further specimens and the ♀ sex of *trilineata* must be forthcoming before a final decision can be made. The kindred genus *Asarcina* shows a disposition to form local races, judging by the excellent series of such forms amongst the African species in the British Museum, and *Dideoides* may be found to possess the same tendency. The characters of my three closely allied species are defined in the table perhaps as clearly as in the descriptions.

Genus **ASARCINA**, *Macq.*

Asarkina, Macquart, Dipt. Exot. ii, 2, p. 77 (1842).

GENOTYPE, *Syrphus rostratus*, Wied.; by original designation.

Characters mainly as in *Syrphus*. Abdomen rather broader, flat. Frons rather abruptly projected into an obtuse antennal prominence; face a little excavated below antennæ; facial bump distinct, more prominent than in *Syrphus*; mouth-border not produced; proboscis rather long, labella large. *Wings* with submarginal cell widened at about the middle and again at tip. In all else as in *Syrphus*. Macquart considers that this genus approaches *Rhingia*, and attributes it to Serville in manuscript. The type-species *rostratus* is evidently more *Rhingia*-like than the two Oriental ones, *ægrotus* and *ericetorum*, in neither of which does the face in any way approach that of *Rhingia*.

Life-history apparently unknown.

Range. South Asia, China, Orient, North and Central Africa. Of the two Indian species, *ericetorum* has pale yellow unmarked wings, and *ægrota* a dark broad band across the middle of the wings.

51. **Asarcina ericetorum**, *Fabr.* (Pl. I, fig. 18; Pl. II, fig. 1.)

Syrphus ericetorum, Fabricius, Spec. Ins. ii, p. 425 (1781).
Asarcina ericetorum, Brunetti, Rec. Ind. Mus. xi, p. 210 (1915).
Syrphus salviæ, Fabricius, Mant. Ins. ii, p. 340 (1787).
Asarcina salviæ, de Meijere, Tijd. v. Ent. li, p. 311 (1908).
Syrphus incisuralis, Macquart, Dipt. Exot. Suppl. 5, p. 94 (1855).
Asarcina typica, Bezzi, Ann. Mus. Hung. vi, p. 499 (1908).
? *Didea diaphana*, Doleschall, Nat. Tijd. Ned. Ind. xiv, p. 409 (1857).

♂ ♀. *Head*: eyes in ♂ closely contiguous for half the distance from vertex to frons; facets uniform in size; vertical triangle very elongate, black with black pubescence; frons bright sulphur-yellow with long black erect pubescence; a semicircular shining blackish-brown spot on upper side of the small antennal prominence, the rest of which, with the antennæ, is brownish-orange; 1st and 2nd joints of latter with black stiff hairs above and below, upper side of 3rd joint brown; arista orange, bare; face and all lower part of head covered with pale yellow tomentum and very fine concolorous pubescence; central bump and mouth-border brownish-orange; proboscis black; occiput dark, with yellowish-grey tomentum on side margins and an unbroken fringe of bright yellow hairs forming a complete circle round the whole head. In ♀, frons at vertex about one-ninth of the head, rather rapidly widening to double that width at level of antennæ; vertex for some distance brilliantly shining violet, with sparse, almost imperceptible fine dark hairs; face with parallel sides, as wide as widest part of frons, with fine yellow pubescence. *Thorax* æneous with a slight brassy tinge, from fore to hind margin; sides of dorsum and the scutellum wholly orange-yellow; pleuræ yellowish-grey. Whole thorax and scutellum covered with

moderately dense, rather fine bright yellow pubescence, but hind border of scutellum with black hairs. *Abdomen* orange-yellow; 1st segment with moderately broad median stripe and hind border narrowly black, the colour slightly broader in middle; sometimes the segment nearly or wholly yellow; 2nd segment with narrow median black stripe present, indefinite or absent; hind margin shining black; 3rd and 4th segments similar, but median stripe absent and occasionally extreme anterior margin black; 5th segment with black hind margin indefinite or absent, occasionally quite distinct. Extreme sides of 1st and basal half of 2nd segment yellow with short yellow pubescence, sides of rest of abdomen narrowly black with short black pubescence. Apical half of abdomen sometimes darkened. Venter yellowish, apical half more or less obscured. Pubescence of 1st and 2nd segments with short yellow pubescence; on hind border of 2nd segment and on all the rest of the abdomen the pubescence is black, though very short and inconspicuous. *Legs* yellow; about the hind half of anterior tarsi, and hind side of hind tibiæ, also all hind tarsi, brown or blackish. *Wings* pale yellowish-grey; subcostal cell and stigma pale yellow; halteres orange.

Length, normally 12–13 mm.

Widely distributed in India and the East, in both hills and plains, throughout the greater part of the year.

Type in Fabricius collection.

52. Asarcina ægrota, *Fabr.*

Eristalis ægrota, Fabricius, Syst. Antl. p. 243 (1805).
Asarcina ægrota, Brunetti, Rec. Ind. Mus. xi, p. 210 (1915).
Syrphus ægrotus, Wiedemann, Auss. Zweifl. ii, p. 118 (1830).
Syrphus fascipennis, Macquart, Hist. Nat. Dipt. i, p. 537 (1834).
Didea ellenriederi, Doleschall, Nat. Tijd. Ned. Ind. xiv, p. 407 (1857).
Syrphus infirma, Rondani, Ann. Mus. Gen. vii, p. 423 (1875).

♂ ♀. *Head*: eyes, vertical triangle and occipnt as in *A. ericetorum*; frons and face shining black, closely covered with yellowish-grey tomentum, on former with black hairs, and with whitish tomentum and pale yellow hairs on latter; antennal prominence shining black except for a small space below in front; bare with sparse black hairs; central bump and a stripe from base of antennæ down to it shining black. Antennæ with 1st and 2nd joints black, 3rd narrowly black, but orange on more or less of basal half below; arista blackish; mouth-border blackish. In ♀, frons about one-eleventh or one-twelfth of head at vertex, gradually widening to about two and a half times as wide at level of antennæ, mainly shining black, with sparse black pubescence, but with a yellowish-grey dust-spot on each side on eye-margin, just above antennal prominence, the spots nearly united at their inner ends. *Thorax*: dorsum shining black with short dark brown pubescence; a collar of erect bright yellow hairs on front

margin; shoulders and hind corners dull yellowish with yellowish pubescence; scutellum yellow, with fine black pubescence; pleuræ grey with white pubescence. *Abdomen* dull black; 2nd segment with a pair of large irregularly oval orange-yellow spots placed obliquely from anterior corners, their inner ends occasionally meeting, occupying a considerable part of the surface; 3rd and 4th each with a broad orange-yellow basal band, one-third to one-half the length of the segment, extending from side to side but occasionally not quite reaching the extreme side margins; hind margin of 4th segment moderately shining black; 5th segment more or less black in middle, sometimes nearly wholly black, rather shining. Pubescence of abdomen pale yellow and conspicuous on yellow spots on 2nd segment, short, black and inconspicuous on rest of dorsum; abdominal side margins (except where the spots on 2nd segment attain the margin) with a distinct fringe of coarser black pubescence. Venter black with base broadly pale and two (sometimes three) pale yellow bands corresponding to those on the dorsum of the 3rd and 4th (and sometimes 5th) segments. *Legs*: coxæ black; anterior femora and tibiæ yellow; base of middle femora blackish; anterior tarsi mainly black, often brownish at base; hind legs wholly black. *Wings* clear; a broad dark brown band from front to hind margin occupying middle third of wing; extreme base brown; halteres yellow.

Length, 11–12 mm.

As widely distributed as *A. ericetorum* in India and the East, both from hills and plains, at almost all seasons of the year.

Location of *type* uncertain.

Genus **ISCHYROSYRPHUS**, *Big.*

Ischyrosyrphus, Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. lxviii (1882).

Ischyrosyrphus, Verrall, Brit. Flies, Syrph. p. 321 (1901).

Genotype, *Syrphus glaucius*, L.; by original designation.

Near *Syrphus*. Eyes distinctly or indistinctly hairy; jowls not more than one-third as deep as diameter of eye; face without median black stripe; abdomen in outline club- or phial-shaped, sometimes broader, sometimes narrower; 2nd segment with a broad, more or less (though always slightly) interrupted band, generally transparent; 3rd segment, and generally 4th also, with a small widely interrupted band.

These are the principal characters set out by Mik in erecting his genus *Lagenosyrphus*, which is considered synonymous with *Ischyrosyrphus* by some authors. Bigot's diagnosis of the latter genus was very faulty, and it seems questionable whether it is advisable to give generic rank to every group of species that differs from the general facies of a very large genus such as *Syrphus*. However, Verrall admits the present genus, and the only Indian species referred to is Bigot's.

53. **Ischyrosyrphus sivæ**, *Big.*

Ischyrosyrphus sivæ, Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. lxviii (1882).

♂. "Antennæ tawny, tip slightly darkened; face and frons yellow; thorax dull æneous with rather dense tawny pubescence, and three longitudinal, narrow, brown stripes; scutellum tawny with tawny pubescence; abdomen concolorous, with rather dense but very short, tawny tomentum; base of abdomen narrowly black; three narrow black transverse bands, widened in the middle. Legs tawny, base of femora black; hind tibiæ and tips of tarsi broadly darkened. Wings pale yellowish; anterior margin a little deeper brownish yellow. Length 19 millim. One specimen, India."

I know nothing of this species. The *type* is recorded as in the Bigot collection, but I have been unable to find it there.

Genus **LASIOPTICUS**, *Rond.*

Lasiopthicus, Rondani, Nuov. Ann. Sci. Nat. Bologna, (2) ii, p. 459 (1844).

Catabomba, Osten-Sacken, Bull. U.S. Geolog. Surv. iii, p. 325 (1877).

GENOTYPE, *Syrphus pyrastri*, L.; by Rondani's designation.

This genus differs from *Syrphus* almost solely in the inflated frons in both sexes, and the area of larger facets on the upper and middle portion of the eye in the ♂. The species have a certain facies of their own, but the genus is not universally recognised, and some authors prefer the use of the name *Catabomba*, Osten-Sacken; though the two genera are perhaps not exactly synonymous, as Rondani's limits of *Lasiopticus* (*Lasiophthicus*) were vague.

The question whether the name *Lasiopticus* or *Catabomba* should stand for the *pyrastri*, L., group of species of *Syrphus* has been discussed previously, but opinions differ, and I have experienced some difficulty in deciding which name to adopt. Verrall's contention was that *Lasiopticus*, as proposed by Rondani in 1844 (the species being described in 1857), was a wholly impossible genus on account of the inclusion of incongruous species; but this does not seem flawless, as in the first place the genus as originally constituted was not more ill-founded than many others of those times; and in the second place, Rondani in 1856 (Dipt. Ital. Prod. i, p. 51) set up a definite type-species, *pyrastri*, L. This would at least attach to that group of species the name *Lasiopticus*, even if that genus was subsequently shorn of all the other species placed in it by Rondani. Therefore, when Osten-Sacken in 1877 erected *Catabomba* on *pyrastri** he went beyond

* Verrall says the genus was founded by Osten-Sacken for *pyrastri* "and its allies," but *pyrastri* was selected definitely as the type of *Lasiopticus* in 1856.

his rights. It would have been better to have defined Rondani's genus* more closely by adding the characters of the inflated frons and the enlarged facets of the upper part of the eyes in the ♂; these being apparently stable characters, whereas the pubescence of the eyes in this group is not a generic character. *Syrphus* contains species with distinctly pubescent eyes in both sexes, others with the eyes moderately hairy in the ♂ and almost bare in the ♀, and still others with quite bare eyes in both sexes. *Lasiopticus* in Rondani's sense has pubescent eyes only, but if *Catabomba* be regarded as synonymous with it, the genus will then contain bare-eyed species also, since Verrall notes (Brit. Flies, Syrph. p. 333) a species from North America in Bigot's collection with bare eyes. *Ischyrosyrphus* also contains hairy-eyed and almost bare-eyed species; whilst the genera *Xanthogramma*, Sch., and *Olbiosyrphus*, Mik, are only separated by the bare eyes of the former contrasted with the pubescent eyes of the latter, and an intermediate species might be considered to unite the genera An American writer (R. C. Osburn, Journ. N. Yk. Ent. Soc. xviii, p. 58, 1910) suggests the suppression of the genus *Catabomba*.

Of the two Indian species of this genus, *L. seleniticus* has the abdominal spots comparatively narrow and curved upwards at the inner ends, whilst *L. latimaculatus* has them very broad and oval.

54. Lasiopticus seleniticus, *Meig.* (Pl. II, fig. 2.)

Syrphus seleniticus, Meigen, Syst. Beschr. iii, p. 304, pl. xxx, fig. 21 (1822).
Catabomba selenitica, Verrall, Brit. Flies, Syrph. p. 337, fig. 280, abd. (1901).
Syrphus lunulatus, Wiedemann, Auss. Zweifl. ii. p. 121 (1830).
Lasiophthicus annamites, Bigot, Ann. Soc. Ent. France, (6) v, p. 250 (1885).

♂ ♀ *Head*, ♂: eyes with dense whitish pubescence, which is sparser on under side; closely contiguous for a short distance; vertical triangle small, black, with black or blackish-brown hairs; ocelli ruby-red; frons and face orange-yellow, generally a little deeper on former, which bears conspicuous black pubescence; space above antennæ blackish- or orange-brown; face with parallel sides from level of antennæ downwards, in width considerably more than one-third of head; with shorter black pubescence which becomes yellow on lower part; an irregular blackish-brown stripe

* A similar case to the present one came before me recently in TIPULIDÆ regarding the genus *Trentepohlia*, Big. This was only "characterised" by its inclusion in a table containing genera belonging to two other subfamilies of TIPULIDÆ, and a genus each of DIXIDÆ and MYCETOPHILIDÆ, besides other wholly unrelated genera of TIPULIDÆ. However, Bigot had stated a type-species and Edwards afterwards sufficiently characterised the genus, so I suppressed my genus *Mongomioides* (erected on Bigot's type of *Trentepohlia*), though I still claim that the nomination of a type-species does not constitute the diagnosis of a genus.

from mouth-border; latter brownish-orange along edge; proboscis blackish. Antennæ black, 1st joint and base of 3rd below more or less orange; arista bare, black. Occiput ash-grey with shorter yellow fringe on upper half and longer whitish fringe on lower half. In ♀, pubescence of eyes less dense; vertex broadly shining black; frons widening rapidly to level of antennæ, thence, the sides parallel (in the two ♀ ♀ before me the brown marks above antennæ deeper and more extended than in ♂). *Thorax* æneous with dense yellowish-brown pubescence; humeri and sides of dorsum dull brownish-yellow, the pubescence there thicker and more orange in colour; pleuræ ash-grey with pale yellow pubescence; scutellum dull brownish-yellow with all-brown pubescence. *Abdomen* black, moderately shining; 2nd segment with a pair of well separated oval orange-yellow spots lying across the middle, the outer ends rather narrowed, passing over side-margins towards anterior corners of segment; 3rd and 4th segments each with a pair of orange-yellow lunules, less separated in the middle line than the spots on the 2nd segment, their upper ends reaching nearly to anterior margin of segment and level with one another, their outer ends passing over side margins near anterior corners; hind border of 4th segment narrowly orange; 5th segment mainly black, margin more or less narrowly orange. Pubescence of abdomen practically following ground-colour. Venter black, more or less yellowish on basal half. *Legs* mainly orange; nearly all the basal half of anterior femora, all the hind femora, a median ring on hind tibiæ and last four tarsal joints, dark brown. Soft, fine, rather long, pale yellow pubescence chiefly confined to basal half of outer and under sides of fore femora, diminishing towards tips; also on hind and under sides of middle femora, and outer and under sides of hind femora, though much sparser on the latter. Tibiæ and tarsi with only normal pubescence. *Wings* clear, stigma and halteres yellowish.

Length, 12–13 mm.

Described from 2 ♂ ♂ and 2 ♀ ♀ in the Indian Museum. Simla, 7000 ft., 5. v. 1907; Theog, 8000 ft., 27 iv. 1907 (both *Annandale*); Mundali, Dehra Dun District, 12,000 ft., 12. v. 1910. One ♀ in the British Museum from the Khasi Hills, Assam, 1878 (*Chennell*). The specimen from Theog was originally recorded by me as *Syrphus luniger*, Meig. A common European species.

55. Lasiopticus latimaculatus, sp. nov. (Pl. II, figs. 3, 4.)

♂ ♀. *Head* pale yellow; vertex rather narrowly deep black with very short black pubescence; frons vesiculose, with brown pubescence on upper part and whitish on lower part, as also on face; mouth-border and traces of a streak extending upwards from it, also frons around base of antennæ, all narrowly brownish. Antennal 1st and 2nd joints brownish-orange, 2nd narrowly black above, 3rd black, brownish-orange below at base, arista orange,

the colours more distinct in ♀ than in ♂. Occipital margin ash-grey with rather dense white pubescence, which is yellowish behind vertex. *Thorax* æneous-black with brownish-grey pubescence on dorsum, white on pleuræ and more yellowish on the broad conspicuous yellow side margins, which reach the yellowish translucent scutellum; latter darker in centre and with black pubescence except for some whitish pubescencc at base. *Abdomen* shining black with three pairs of broad subequal orange spots, the 1st pair lying across middle of 2nd segment, well separated, oval and continued broadly over anterior part of side margins; 2nd and 3rd pairs, on 3rd and 4th segments, rather less widely separated than 1st pair, approximately oval, slightly curved, with outer ends truncate, parallel to but quite clear of side margins; 4th segment with narrow orange hind margin; 5th black with narrow side and hind margins. Genitalia orange, marked with black; venter yellow with black transverse marks. Pubescence of abdomen practically following ground-colour. *Legs* orange-yellow; coxæ, anterior femora for nearly basal half, hind pair for more than basal half, black; upper side of tarsi brownish. *Wings* colourless, stigma pale yellow; squamæ whitish with white pubescence.

Length, 11 mm.

Described from a ♂ from Allahabad, 12. i. 1906 (*Howlett*), and a ♀ from Peshawur, 18. iii. 1913, "on rye grass" (*Howlett*); Ferozepore, v. 1908, ♂ ♀; Abu, ♂ ♀ (both *Nurse*).

Types sent to the British Museum by Mr. T. B. Fletcher.

Genus **SYRPHUS**, *Fabr.*

Syrphus, Fabricius, Syst. Ent. p. 762 (1775).
Scæva, Fabricius, Syst. Antl. p. 248 (1805).
Psylogaster, Lioy, Atti Isti. Veneto, (3) ix, p. 753 (1864).
Epistrophe, Walker, Ins. Saund., Dipt. i, p. 242 (1852).

GENOTYPE, *Musca ribesii*, L.; by universal acceptance *.

Head as broad as or rather broader than thorax; eyes contiguous in ♂, well separated in ♀, generally bare, but varying up to densely pubescent; frons prominent; face slightly hollowed below antennæ, a moderately large central knob and the mouth-border produced; face wholly yellow or yellow with a median black stripe; antennæ of moderate and normal Syrphine type, 3rd joint oval, arista nearly basal, bare or slightly pubescent. *Thorax* subquadrate or slightly wider just beyond middle, black or æneous, or at most slightly yellowish towards sides, but without conspicuous markings on pleuræ; scutellum normally yellow, with

* Coquillett's suggestion to apply the name *Syrphus* to *Leucozona lucorum* is unwarrantable; the species *ribesii* has always been accepted as typical of this genus, and I decline to trouble about any presumed claim of any other group of species to the name *Syrphus*.

soft pubescence, as has also the thoracic dorsum. *Abdomen* longer than thorax, segments subequal in length except the very short last one in ♂ and the small anal segments in ♀; ranging in shape from a short oval to a long oblong, generally broader in ♀; yellow or pale spots or bands present in all species. *Legs* simple, slightly pubescent. *Wings* with typical Syrphine venation; anterior cross-vein before middle of discal cell, 3rd vein normally almost straight; alulæ and squamæ of moderate size. Wings folded over abdomen at rest.

Life-history. The larvæ feed on Aphides, the metamorphoses of several European species being known *.

Range. World-wide.

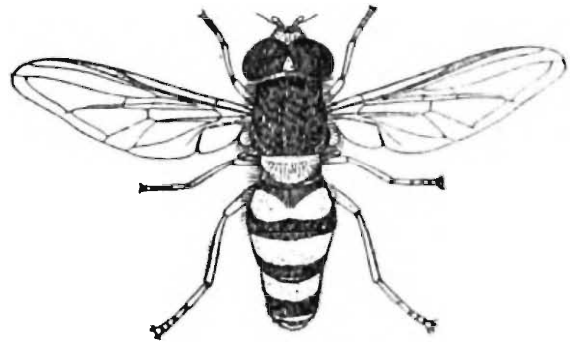

Fig. 16.—*Syrphus confrater*, Wied., ♂.

The typical genus of the family, forming the centre of a group containing *Didea*, *Platychirus*, *Melanostoma*, *Pyrophœna*, *Chilosia* and allies, and some others. *Lasiopticus*, Rond., and *Ischyrosyrphus*, Big., are recognised as distinct, though they do not strongly appeal to me as such. Some confusion has arisen over the synonymy of the genus which is lucidly explained by Verrall †. This author also records two swarms (consisting of more than one species) that occurred in England in 1869, simultaneously at two places. The genus occurs almost everywhere, though its natural home seems to be Europe. De Meijere gives some valuable notes on the Oriental species, with a table (Tijd. v. Ent. li, p. 291 *et seq.*).

Table of Species.

1.	Eyes pubescent	2.
	Eyes bare	10.
2.	Two definite greyish stripes on anterior part of thorax (less distinct in *serarius*)	3.
	No such obvious stripes; at most, traces in individuals	4.
3.	A black facial stripe; grey thoracic stripes more distinct	*albostriatus*, Fln., p. 72.
	No facial stripe; grey thoracic stripes less distinct	*serarius*, Wied., p. 73

* See p. 25 and footnote to p. 26.

† Brit. Flies, Syrphidæ, p. 340.

4.	No facial black stripe, but central bump may be black	5.
	A black facial stripe (brown and very narrow in *opimius*)	7.
5.	Abdominal bands divided into three pairs of spots	*æneifrons*, Brun., p. 75.
	Abdominal bands entire (in *serarius*, the pair of spots on the 2nd segment often united, forming a narrow band still narrower in middle)	6.
6.	Under side of 3rd antennal joint always more or less orange (abdominal bands yellow)	*torvus*, Ost.-Sack., [p. 76.
	Antennæ wholly black	*griseocinctus*, sp. n.,
7.	Abdomen with 3 pairs of spots	8. [p. 77.
	Abdomen with 2nd and 3rd abdominal bands entire	9.
8.	Abdominal spots large, sub-lunate	*opimius*, Walk., p. 78.
	Abdominal spots narrower, linear	*remotus*, sp. n., p. 78.
9.	Vertex brilliant shining violet; face dull yellowish with small central bump shining black; anterior femora practically all yellow, at most extreme base black; hind legs blackish	[p. 79. *transversus*, Brun.,
	Vertex black; face orange-brown with broad black stripe; anterior femora black on basal third to half; hind legs apparently with more black surface than in *transversus*	*orsua*, Walk., p. 80.
10.	Thorax with obvious grey or bronze stripes, at least on anterior margin	11.
	Thorax without obvious grey stripes, at most, traces of such in individuals	12. [p. 81.
11.	Thoracic stripes five, bronze-coloured	*quinquevittatus*, sp. n., [p. 82.
	Thoracic stripes two, greyish, sometimes indistinct	*balteatus*, De Geer,
12.	Abdomen rather conspicuously narrow	*cinctellus*, Zett., p. 84.
	Abdomen of usual ovate shape	13.
13.	Abdomen with three pairs of spots; no entire transverse band	14.
	A pair of spots on 2nd segment; 2nd and 3rd abdominal bands entire	15.
	All three abdominal bands entire *	18.
14.	Abdominal spots clearly passing over side margins; genitalia in ♂ very large; scutellum yellow-haired	*corollæ*, Fabr., p. 85.
	Abdominal spots clear of side margins; genitalia in ♂ of normal size; scutellum black-haired	*luniger*, Meig., p. 86.
15.	No facial black stripe	16.
	A black facial stripe	17.

* *S. confrater*, Wied., is included under this heading, as the markings of the 2nd abdominal segment generally consist of a pair of elongate, transverse spots broadly united at their inner ends, thus forming an entire band; but in some specimens they are just separated. Wiedemann described them as a pair of contiguous spots, which is an excellent definition.

16.* Facial bump pale yellow; scutellum yellow-haired; hind femora partly (♂), or entirely (♀), orange, hind tibiæ mainly orange . . . . . [p. 87. *latifasciatus*, Macq., [p. 89.

Facial bump dark; scutellum black-haired; hind femora and tibiæ nearly all black. *fulvifacies*, Brun.,

17 Hind legs with conspicuous black pubescence: long. 14–15 mm. . . . . *æqualis*, Walk., p. 90. [p. 91.

Hind legs without such conspicuous black pubescence: long. 6 mm. . . . . *maculipleura*, Brun., [p. 92.

18. Abdominal bands lying across middle of segments, nearer front than hind margins. *confrater*, Wied.,

Abdominal bands placed on hind margins of segments, each band slightly overlapping the following segment*. *assimilis*, Macq., p. 94.

56. **Syrphus albostriatus**, *Fln.* (Pl. II, figs. 5–8.)

Scæva albostriata, Fallén, Dipt. Suec., Syrph. p. 42 (1817).
Syrphus albostriatus, Verrall, British Flies, Syrph. p. 344, figs. 282–284.
Syrphus carinthiacus, Latzel, Jahrb. d. naturh. Landesmus. von Kärnten, p. 105 (1876).

♂ ♀ *Head*: ♂, eyes absolutely contiguous for only a short distance, but very narrowly separated thence to vertex, bearing dense brown pubescence; frons with dark grey dust and black hairs, mainly occupied by the relatively large shining black antennal prominence; face bright chrome-yellow, a little darker below antennæ, with a distinct black median stripe enclosing the shining central bump; cheeks orange, generally sharply demarcated from face by a clear-cut black stripe; pubescence of face fine, black, that of cheeks whitish. Antennæ and proboscis black. Occiput grey, with a yellowish-white uninterrupted fringe, which is more whitish on lower part and more yellowish on upper part, where there are some long black hairs on vertex. In ♀, frons from vertex to base of antennæ shining black with a broad transverse grey space across the middle, the colour continued narrowly along eye-margins till merged in the yellow face. In both sexes both frons and face sometimes almost translucent. *Thorax* moderately shining æneous-black; a pair of obvious though not conspicuous short grey stripes, narrowly separated, extending from anterior margin hindwards to beyond suture; a slight greyish tinge at each end of suture; pleuræ dark grey, shining; pubescence of dorsum and pleuræ yellowish or yellowish-grey, scutellum brownish-yellow, with wholly long black pubescence except for some shorter yellow hairs in front. *Abdomen* black;

* I add this species to the table, as Macquart's expression "near *ribesii*" should mean that the eyes are bare; however, he uses the same expression with regard to his *consimilis*, in which he states the eyes to be pubescent.

on 2nd segment a pair of moderate-sized yellow oval spots placed across centre, near sides, well separated from each other and clear of side margins; 3rd segment with a sinuate narrow yellow band of uniform width from side to side, placed a little before middle of segment and broadly contiguous to centre of anterior margin. In some specimens this band is slightly emarginate behind at the middle. Fourth segment similar to 3rd. Pubescence following ground-colour except for a few black hairs at hind corners of segments. In ♀, band on 3rd abdominal segment rather less sinuate and much narrower in middle than in ♂; hind corners of 4th segment and hind margin of 5th narrowly orange. *Legs* orange-yellow; basal half of anterior femora, and more than basal half of hind femora, black, also hind tibiæ more or less blackish towards tips; upper side of hind tarsi blackish-brown. *Wings* pale yellowish-grey; stigma distinct, long, yellowish-brown; halteres orange, squamæ yellowish.

Length, 8½–10 mm.

Described from several ♂♂ and a single ♀ in the Indian Museum. Mundali, Dehra Dun District, 9000 ft., 10. v. 1910; Matiana, Simla District, 8000 ft.; Kurseong, 4700 ft., 15. iv. 1911 (*Annandale*); Darjiling, 6900 ft., 20. x. 1905 (*Brunetti*), a rather dark variety. Distributed throughout Europe. There is no doubt about the identification, the grey-striped thorax and the convex yellow abdominal bands being striking and unusual characters.

57. Syrphus serarius, *Wied.* (Pl. II, figs. 11–14.)

Syrphus serarius, Wiedemann, Auss. Zweifl. ii, p. 128 (1830); de Meijere, Tijd. v. Ent. li, p. 296 (1907).

♂ ♀. *Head*: in ♂, eyes with dense brown pubescence; vertical triangle small, black with black hairs; upper part of frons almost æneous, sometimes with greenish or yellowish tinges, with close blackish-grey dust and long black pubescence. Antennal prominence shining violet-black, space round base of antennæ narrowly orange; face with ground-colour orange, often with an æneous tinge, with dense yellowish-grey dust and rather thick though not conspicuous dark brown pubescence, which becomes whitish and short about the mouth; the border of the latter is blackish, the central bump shining black, bare; cheeks very narrow, almost absent, ash-grey with sparse short yellowish-grey hairs. Antennæ and arista all black, but base of 3rd joint on under side sometimes dull orange. Occipital orbit with thick yellowish-grey fringe. In ♀, vertex broadly shining violet-black, the colour sometimes extending as far as the antennæ, or sometimes interrupted by a grey-dusted space of greater or less extent. *Thorax* moderately shining black, sometimes with a slight æneous tinge, with brownish-grey pubescence; bright yellow pubescence at sides of dorsum in front and black pubescence around

wing-base; pleuræ ash-grey with whitish pubescence; hind corners of dorsum dull translucent yellow with yellow pubescence. Scutellum dull translucent yellow; pubescence yellow on basal half and black on the remainder. *Abdomen* dull indigo-black; 1st segment shining æneous; on 2nd segment a pair of very elongate-triangular yellow spots across middle of segment, their apices sometimes well separated on middle line, sometimes bluntly united, forming a complete transverse band; their bases near but never reaching side margins of segment; 3rd segment with a rather broad orange band, widening a little towards sides and just reaching side margins, sometimes narrowly so on anterior corners, sometimes quite broadly; 4th segment with a similar band which is yellowish-grey or wholly greyish, much less conspicuous than that of 3rd segment and generally fainter in centre, widening towards and reaching side margins, though indistinctly; hind margin of 2nd segment often extremely narrowly orange, of 4th segment often more æneous; 5th segment generally shining æneous. Pubescence of abdomen yellowish on pale parts and wholly on 2nd segment; black parts with black pubescence, but with some straggling pale hairs intermixed; pubescence on side margins of abdomen yellowish on front half or two-thirds of each segment, but black on hinder part. Venter blackish with indistinct pale bands corresponding to those of upper side. In ♀, 1st band normally entire, sometimes barely narrowed in middle, sometimes interrupted more broadly in middle, the yellow colour replaced at that spot by an æneous tinge. Bands in ♀ always wider than in ♂, in some individuals the 2nd band nearly filling the segment, giving the appearance of a distinct species. In some specimens of both sexes the abdominal bands are very narrow, the spots on the 2nd segment equally so and widely separated, all these markings being bluish-grey or plumbeous. *Legs* brownish-orange; nearly all the basal half of anterior femora, hind femora wholly except at tips, an indistinct narrow median ring on anterior tibiæ and a broader one on hind tibiæ, also all tarsi, black. The black marks in some specimens much less conspicuous or replaced by brown ones; sometimes the legs scarcely dark; and the tarsi sometimes at most brown instead of black. The black colour generally less extensive in ♀, as the anterior tibiæ in this sex are sometimes wholly browish-orange. *Wings* clear; stigma pale brownish-yellow; halteres dull yellowish.

Length, 7–10 mm.

Described from a number of both sexes in the Indian Museum and Pusa collections. Mussoorie, ix. 1906; Kumaon, 5000 ft., 10–12. ix. 1909 (*Lynch*); 6000 ft., 21–26. viii. 1918 (*Fletcher*); Almora, 5500 ft., 22–26. ix. 1911 (*Paiva*); Murree, 7500 ft., 18. vi. (*Dutt*); Soondrijal, Nepal; Nagorkote, Nepal; Singla, Darjiling District, 1500 ft., iv. 1913; Lebong, Darjiling District, 4500 ft., 2–9. v. 1909 (*Howlett*); Chapra, Bengal (*Mackenzie*); Pusa, 19. ii. 1908, "reared from maggot predaceous on *Aphis cardui*"; 5. iii. 1911, on Kusum; 12. iii. 1909, on grass; Coorg, S. India,

15–20. x. 1915 (*Fletcher*); Shillong, 5500–6400 ft., 29. viii.–5. ix. 1915 (*Kemp*); Mangaldai, Assam–Bhutan Frontier, 31. xii. 1910 (*Kemp*). A short series of both sexes in the British Museum from the lower ranges, Khasi Hills, Assam, 1878 (*Chennell*). De Meijere redescribes the species from a single ♀ from Pattipola, Ceylon, 2000 metres (*Biro*), in the Hungarian Museum, and records the species again from three localities in Java, adding a very useful table of 15 Javanese species (Tijd. v. Ent. lvii, p. 160, 1914). Coquillett records it from Japan. Originally described from China.

Some specimens of both sexes have the abdominal markings narrowed down to rather fine lines of a blue-grey or plumbeous colour, and in these the legs appear to be more brownish than in the more normal specimens. Of this form there are a ♂ and ♀ in the Indian Museum, respectively from Painsur, Garhwal District, W Himalayas, 7500 ft., 20. iv. 1914 (*Tytler*), and Almora, Kumaon District, W Himalayas, 5500 ft., 30. ix.–4. x. 1911 (*Paiva*).

This species has a very close resemblance to *S. adligatus*, Wied., which extends from Abyssinia to the Cape and shows a tendency to form races. The chief difference is in the band on the 3rd abdominal segment, which is broader in *adligatus* and occupies completely the anterior border, but which in *serarius* is placed distinctly behind the border. A minor character is in the stigma, which in the African species is more conspicuously black at its inner end than in the Eastern one.

58. Syrphus æneifrons, *Brun.*

Syrphus æneifrons, Brunetti, Rec. Ind. Mus. viii, p. 159 (1913).

♂ *Head*: eyes with dense dark brown pubescence, touching for about the middle third of the distance from vertex to tip of frons; latter black with a few stiff black hairs curved forward; frons æneous-bronze, antennal prominence black, both with long black hairs; face orange-yellow, barely produced in middle, just above mouth, where it is blackish; mouth-border and lower edge of face black, with a few black hairs: proboscis brownish. Antennæ wholly black, 2nd joint emarginate, black bristles at tip; 3rd joint elongate-conical, arista black. Posterior orbit of eyes with a fringe of bright orange, scale-like, thick hairs; occiput grey. *Thorax* shining black with brownish-yellow hairs; sides dark grey; pleuræ with grey or yellowish-grey hairs; scutellum yellowish with dark brown hairs. *Abdomen* ovate, black, moderately shining; 2nd segment with a pair of elongate-triangular yellowish spots, their bases placed near lateral margins, their apices nearly reaching centre of segment; 3rd segment with a pair of elongate spots near anterior margin, not attaining lateral margins, slightly widened towards sides in one specimen, but of uniform width in type; these spots nearly meet in the centre of segment (probably in individual specimens actually are united). Fourth segment with

two similar spots but rather smaller; these in the type are of uniform width, but in the second specimen are distinctly wider towards the sides as in the previous segment. Pubescence of abdomen concolorous with ground-colour; a quantity of pale yellow or whitish-yellow hair laterally at base. Venter blackish, with greyish reflections, yellowish about the middle. *Legs*: coxæ and basal half of femora black; tarsi brown; remainder of legs yellowish or brownish-yellow; a little whitish and pale yellowish hair on femora, longer on under side. *Wings* colourless; stigma dirty brownish-yellow; halteres dull red-brown.

Length, 10 mm.

Described from two ♂ ♂; the type taken between Kalek and Misshing (4000 ft.), 18. iii. 1912; the second example taken at Yembung (1100 ft.), 17 iii. 1912 (*Abor Expedition*). *Type* in Indian Museum.

59. **Syrphus torvus**, *Ost.-Sack.*

Syrphus torvus, Osten-Sacken, Proc. Boston Soc. Nat. Hist. xviii, p. 139 (1875).
Scæva ribesii, Fallén, Dipt. Suec., Syrph. 40, 6 var. (1817).
Scæva topiarius, Zetterstedt (*nec* Meigen), Ins. Lapp., Dipt. p. 599 (1838); id., Dipt. Scand. ii, p. 723 (1843).
Syrphus topiarius, Schiner, Faun. Austr. i, p. 304 (1862).
Syrphus torvus, Verrall, Brit. Flies, viii, p. 356 (1901).

♂ ♀. *Head*: ♂, eyes contiguous for a distance equal to length of vertical triangle, with grey pubescence: vertical triangle black with long black hairs; frons with yellow dust and long black pubescence; above antennæ, shining black with an orange margin; face wholly covered with yellow dust which is more orange on cheeks, all covered with fine black pubescence; antennæ black, under side of 3rd joint dull reddish-brown; occiput dusted with yellowish-grey, marginal fringe bright yellow, some black hairs intermixed behind vertex. In ♀, frons at level of antennæ more than one-third of head; a considerable space at vertex and a similar space above antennæ, brown; rest of frons yellow-dusted as in ♂. *Thorax* dull greenish-grey; pleuræ dark grey; scutellum brownish-yellow; pubescence on dorsum of thorax brownish-yellow, brighter yellow round wing-bases, pale yellow on pleuræ and wholly black on scutellum. *Abdomen* black; 2nd segment with a pair of oval yellow spots, well separated, across middle, narrowly overlapping side margins near anterior corners; 3rd and 4th segments each with a yellow band placed just clear of anterior margin, though its centre might actually touch it for a space; it is a little emarginate behind in middle, and each end clear of the side margins, except at anterior corners, where it passes over the edge. Hind margins of 4th and 5th segments orange. Genitalia orange and black. Pubescence mainly following ground-colour, but entirely pale yellow on 2nd segment except on hind margin; that on the cross-bands brownish. Venter, basal half

yellowish, rest blackish; pubescence pale, long, sparse. *Legs* orange; about basal half of anterior, and two-thirds of hind, femora, black; an indefinite brown ring on apical half of hind tibiæ; tips of anterior tarsi and all of the hind pair dark. Pubescence of legs pale yellow; some black hairs behind anterior femora and a row of black bristles down outer side of hind tibiæ. *Wings* nearly clear; stigma pale yellow; halteres orange; squamæ yellowish with deeper edges.

Length, 10–12 mm.

Described from 3 ♂♂ and 1 ♀ from the Simla District; Matiana, 8000 ft., 28–30. iv. 1907 (*Annandale*).

The only discrepancy with Verrall's description in the above specimens lies in the black, instead of yellow, hairs on the face. The species has a wide range in Europe and North America.

60. **Syrphus griseocinctus**, sp. nov. (Plate II, fig. 10.)

♂. *Head*: eyes with close, short greyish pubescence; vertical triangle black with long black hairs; frons comparatively small, shining brownish-yellow, with rather long and dense black pubescence; antennal prominence shining black with narrow orange front margin; face pale brownish-yellow, with yellowish-grey dust and soft pale yellow pubescence. Antennæ all-black, also arista. Facial bump shining brown, bare, upper part of mouth-border narrowly black; cheeks with traces of orange. Occipital margin yellowish-grey with yellow fringe. *Thorax* slightly greenish-æneous with dense yellow, rather long pubescence; pleuræ yellowish-grey; hind corners of dorsum and scutellum brownish-yellow, translucent. Pubescence on pleuræ yellowish, on side margins of dorsum more orange, on scutellum mainly black, with pale hairs at base. *Abdomen*: 1st segment æneous, rest black; hind margin of 4th segment broadly, and more than apical half of 5th, rather shining; a narrow grey band with parallel sides across middle of 2nd segment, and similar bands just behind base of 3rd and 4th segments, none of the bands reaching the side margins; last segment all shining black. Pubescence golden-yellow except that of 2nd segment, which is almost all yellow, but has some darker hairs intermixed on hinder part. Venter dusky blackish, a little shining. *Legs*: coxæ, basal half of anterior femora, more than basal half of hind pair, apical half of hind tibiæ, anterior tarsi towards tips and hind pair wholly, black; rest of legs orange. Pubescence on femora pale yellow, on rest of legs following the ground-colour. *Wings* pale grey; stigma distinct, brownish-yellow; halteres dark.

Length, 13 mm.

Described from a single ♂ in the Indian Museum from Bogarkote, Kumaon, W Himalayas, 8000 ft., 29. iv. 1914 (*Tytler*).

The species closely resembles *æqualis*, Walk., but is recognised by the pubescent eyes and by the absence of the long, dense black hair on the hind legs.

61. **Syrphus opimius**, *Walk.*

Syrphus opimius, Walker, Ins. Saund., Dipt. pt. 3, p. 232 (1852).

♂. "Head yellow, clothed with black hairs, paler and clothed with pale yellow hairs beneath; eyes red, clothed with short pale hairs; feelers tawny, pitchy above; 6th joint tawny; chest and breast steel-blue; chest thickly clothed with tawny hairs; sides and scutcheon tawny; breast tinged with hoary, clothed with hoary hairs; abdomen pitchy, obconical, much longer but not broader than the chest, adorned with three very broad interrupted and two very slender entire yellow bands, the second and the third arched, the fourth and the fifth at the tip; hind borders of the segments and tip blue; legs tawny; feet pitchy, tawny at the base; thighs towards the base, hind thighs and hind shanks more or less pitchy; wings colourless; wing-ribs tawny; veins black, tawny at the base; brands brown; poisers tawny.

"Length of the body 5 lines; of the wings 10 lines. East Indies."

Type in the British Museum in very bad condition.

Head: frons and face pale yellow; former with a slight shining æneous tinge and black pubescence; face with fine black pubescence. Antennal 1st and 2nd joints rather bright shining brown, 3rd blackish, dull red-brown below at base; facial bump moderately large, gently curved, an obvious light brown median stripe. *Thorax* æneous, with brownish-grey or yellowish pubescence, more yellowish on pleuræ; scutellum translucent yellow, with rather long and dense brownish-yellow pubescence. *Abdomen* (considerably damaged) probably shining blue-black, with a pair of large yellow spots on 2nd, 3rd and 4th segments; those on 2nd segment broadly separated, transverse, with parallel sides, rounded on inner ends, the outer ends reaching side margins; spots on 3rd and 4th segments sublunate, less widely separated, placed on anterior margin, outer ends reaching front corners of segments; 5th and 6th segments with hind margins narrowly orange-yellow. Abdominal pubescence whitish, venter more or less yellowish. *Legs* orange-yellow; anterior femora with basal half blackish; hind legs more or less brownish-yellow; hind tibiæ a little darker about middle, where there is a little black pubescence; rest of pubescence of legs pale yellow or whitish; tarsi more or less brown above. *Wings* clear, highly iridescent; stigma brownish.

The specimen has been labelled "*Catabomba*" by someone, but appears to be a true *Syrphus*.

62. **Syrphus remotus**, sp. nov. (Pl. II, fig. 15.)

♂ *Head*: eyes with dark brown pubescence; vertical triangle black with dark brown hairs; frons blackish-grey dusted with long brown pubescence; antennal prominence shining brown; face chrome-yellow with brown pubescence and a distinct black, rather

broad, median stripe, the upper end drawn out to a fine point just below the all-black antennæ and arista; cheeks orange; occipital fringe yellowish-grey, brown behind vertex. *Thorax* brown-æneous; pleuræ greyish; scutellum brownish-yellow. Pubescence of dorsum brownish-yellow, of pleuræ pale yellow, of scutellum long and black. *Abdomen* moderately shining black with a deep blue tinge; 1st segment æneous; 2nd with a pair of widely separated, rather elongate yellow spots, bluntly wedge-shaped, their bases parallel to, but quite clear of, the side margins; 3rd and 4th segments each with a pair of elongate spots, with nearly parallel sides, on front half of segment; inner end of each spot very slightly nearer anterior margin of segment than outer end, which latter at its anterior part just reaches side margins. Hind margin of 4th segment wholly black, shining. Genitalia rather large. Pubescence yellowish-grey on pale parts of dorsum, black on remainder; on side margins yellowish, except at hind corners where it is black. Venter black, 1st and 2nd segments yellowish; hind margins of remaining segments narrowly orange; pubescence pale, long, yellow. *Legs* orange; coxæ, basal half of anterior femora, hind pair wholly except tips, a median ring on front tibiæ, a post-median ring on middle tibiæ, and hind tibiæ wholly except broadly at base, black; tarsi brownish, hind pair darker. Pubescence mainly confined to a little pale yellow hair on basal half of femora, but some long black hairs on apical half of middle femora on under side. *Wings* yellowish-grey; stigma dark brown; halteres brownish-orange; squamæ yellowish-grey with yellow fringe.

Length, 8 mm.

Described from a single ♂ in the Indian Museum. Kufri, Simla Hills, 8000 ft., 11. v. 1909 (*Annandale*). There is about this species some general resemblance to *S. albostriatus*, Fln., but the thorax has no pale stripes and the bands on the 3rd and 4th abdominal segments are separated into spots. It is also obviously allied to, though distinct from, *S. opimius*, Walk., the abdominal spots being smaller and practically linear, instead of distinctly sub-lunate and considerably larger. It is also a smaller species.

63. Syrphus transversus, *Brun.*

Syrphus transversus, Brunetti, Rec. Ind. Mus. viii, p. 160 (1913).

♀ *Head*: eyes with yellowish-white pubescence: frons gradually widening from vertex to base of antennæ, where it is fully one-third width of head; vertex shining violet, bare, except for the ocellar triangle which bears a few short black hairs; rest of frons dusted with yellowish-white, but for a large space around the antennal protuberance it is shining black; face pale yellow, more whitish below, central bump rather small, shining black, the colour extending in a stripe to the mouth. Whole frons (except the vertex) down to antennæ with black pubescence; whole face with whitish pubescence, which is longest on lower part and

around the black mouth-border. Proboscis blackish-brown. Antennæ wholly black, much as in *æneifrons*, 3rd joint a little shorter. Anterior edge of antennal protuberance brownish-yellow. Back of head ash-grey; upper posterior orbit of eyes with a fringe of bright yellow scale-like thick hairs, lower part of orbit with similar white scaly hairs. *Thorax* æneous, with pale brownish-yellow hairs; sides ash-grey with whitish hairs. Scutellum yellowish, with yellow hairs on dorsum and long black hairs in region of posterior border, and soft pendent white hair below. *Abdomen* ovate, black, 1st segment æneous, very short; 2nd, 3rd and 4th segments with a moderately broad yellow band on each, none of the bands attaining the side margins, all narrowed in the middle, the 1st and 3rd bands practically interrupted there; in fact, the 1st band is really composed of two elongate triangular yellow spots, their apices not contiguous, but connected by a small grey-dusted patch. The 3rd band is actually interrupted for a very short space, and in individual specimens might easily resolve itself into two elongate spots; pubescence of abdomen concolorous with ground-colour, a good deal of white hair laterally at base, and short pubescence along side margins except where the black parts of the abdomen intervene; venter blackish, the two wider bands duplicated as on the dorsum, pubescence sparser; in certain lights the dorsal abdominal bands have a creamy shade, especially the 1st band. *Legs*: coxæ, anterior femora at base, and about basal half of hind femora, black; tibiæ brownish-yellow, tarsi brown or blackish-brown, hind pair with golden-brown pubescence below; femora with pale hair, hind tibiæ with minute black pubescence on outer side. *Wings* clear, subcostal cell pale yellow; halteres yellowish-white.

Length, 10 mm.

Described from one ♀ from Sadiya, Assam, 28. xi. 1911 (*Kemp*).

In the Indian Museum. The unique *type* is now considerably stained, the abdominal markings being indistinguishable.

64. **Syrphus orsua**, *Walk.*

Syrphus orsua, Walker, Ins. Saund., Dipt. i, p. 231 (1852).

The type was headless when described and is now in very indifferent condition. A probably conspecific ♀ from Sumatra in the British Museum is in equally bad condition.

Head: frons broad at vertex, rapidly widening downwards, æneous-black, with moderately dense black pubescence; eyes with rather dense dark brown pubescence. Antennæ dull black. Face distinctly prominent, apparently dull yellowish-brown, with dark pubescence and a distinct, broad black median stripe; cheeks apparently dark brown, with a blackish stripe between them and the face. Post-ocular pubescence yellowish. *Thorax* æneous with a blackish tinge, a barely tawny tinge towards sides, on

which parts there is some yellowish pubescence; scutellum dull brownish-yellow, with rather long and fine black hairs. *Abdomen* black; a pair of well-separated, narrow, transverse yellow spots before middle of 2nd segment, slightly widening towards sides; 3rd and 4th segments with a transverse, moderately narrow yellowish stripe (rather arcuate in front) on each, the centre of each stripe just touching hind margin of segment in front, but the ends not reaching side margins. Hind margins of 4th and 5th segments narrowly yellowish, anterior corners of 5th rather broadly so. Abdominal pubescence yellowish; venter yellowish, with broad, transverse obscure bands towards hind margins of segments. *Legs*: anterior pairs (type) mainly yellowish, with about basal third dark; hind legs considerably more brownish; the latter in the Sumatran specimen practically all black, except very narrowly brown about the knees and metatarsi. *Wings* clear, stigma moderately dark brownish-yellow; halteres brownish-orange.

Length, (Sumatran specimen) 10 mm. The type must have been about the same. It is labelled "India," and is from the Saunders collection. The second specimen is from Mt. Dempo, Sumatra, 7000–10,400 ft., 1. v. 1881 (*Forbes*).

Type in British Museum.

65. **Syrphus quinquevittatus**, sp. nov. (Pl. II, fig. 16.)

♂ ♀ *Head*: eyes bare. In ♂, frons rather prominent, yellowish-dusted, with rather long and moderately dense black hairs; face almost translucent, with a pale yellowish tinge and whitish dust; moderately prominent with a conspicuous central, shining black bump, the colour extending to mouth-opening. Antennæ black, basal joints blackish-brown, with a transverse shining black callus on frons immediately above. Occiput grey; postocular fringe white, more yellowish behind vertex. In ♀, vertex broadly shining black, the colour continued down centre of frons to the shining black antennal prominence; rest of frons with yellowish-grey dust, whole surface from vertex to antennæ with rather dense black pubescence; space between antennæ orange, latter wholly black; face yellowish with yellowish-grey dust and pale yellow soft pubescence; central bump large, shining black, bare, the colour extended upwards slightly; mouth-border at upper edge black, remainder, with cheeks, orange; occiput grey, lower part broadly orange; marginal fringe yellowish-grey, yellow behind vertex. *Thorax* æneous, with a bronze tint in certain lights; five obvious, though not conspicuous, bronze stripes from anterior margin nearly to scutellum, the outermost ones on extreme edge of dorsum. Pleuræ ash-grey; humeri yellowish-grey; hind corners of dorsum yellowish; scutellum brownish-yellow, translucent. Pubescence of dorsum yellowish; of humeri, side margins and hind corners bright yellow; of pleura, pale yellow, but bright yellow round wing-base; of scutellum, black. *Abdomen* bright yellow, 1st segment æneous, 2nd, 3rd and 4th

with narrow (♂) or broad (♀) black hind margins, each successively wider, those on 3rd and 4th segments in ♀ reaching to middle of segments, a narrow indefinite median black line on 2nd segment. Hind margins of 4th segment narrowly shining yellowish in ♂, more broadly æneous in ♀; 5th segment all shining black. Pubescence bright yellow on 2nd segment towards sides, shorter and paler in middle of segment; whitish on yellow parts of rest of abdomen, black on black parts. On side margins of abdomen, pubescence all yellowish except for some black hairs where the black bands occur. Venter blackish, with a little short pale hair. *Legs* orange; apical half of hind femora, and remainder of hind legs black; anterior tarsi brownish towards tips; pubescence following ground-colour. *Wings* quite clear; stigma brownish-yellow; halteres brownish-orange; squamæ yellowish with long, soft bright yellow fringe.

Length, 12 mm.

Described from a single ♂ in the Indian Museum, from Kalimpong, Darjiling District, 600–4500 ft., 24. iv.–10. v. 1915 (*Gravely*), and a single ♀ from the Pusa collection, Shillong, 5000 ft., 17 ix. (*Fletcher*).

Type ♂ in Indian Museum, ♀ sent to British Museum by Mr. T. B. Fletcher.

66. **Syrphus balteatus**, *De Geer*. (Pl. I, figs. 19, 20.)

Musca balteata, De Geer, Mém. Insectes, vi, p. 116 (1776).
Musca canabina, Scopoli, Ent. Carn. p. 344 (1763).
Musca scitulus, Harris, Expos. Engl. Ins. p. 105, pl. xxxii, fig. 33 and (*scitule*), p. 111, pl. xxxiii, fig. 55 (1776).
Musca alternatus, Schrank, Enum. Ins. p. 448 (1781).
Musca nectareus, Fabricius, Mant. Ins. ii, p. 341 (1787).
Syrphus balteatus, de Meijere, Tijd. v. Ent. li, p. 297 (1908).
Syrphus viridaureus, Wiedemann, Anal. Ent. p. 35 (1824).
Syrphus nectarinus, Wiedemann, Auss. Zweifl. ii, p. 128 (1830).
Syrphus alternans, Macquart, Dipt. Exot. ii, 2, p. 89 (1842).
Syrphus triligatus, Walker, Proc. Linn. Soc. Lond. i, p. 19 (1856).

♂ ♀. *Head*: eyes bare, contiguous in ♂ for a short distance; vertical triangle in ♂ more or less greyish-black with black hairs; frontal triangle yellow-dusted with yellow hairs. Face in ♂ orange, with grey dust and pale pubescence, or with pale yellowish tomentum and concolorous pubescence; central bump yellow, bare; cheeks sometimes blackish near lower corners of eyes. Frons in ♀ rapidly broadening from vertex to base of antennæ, twice as wide below as at vertex, æneous or greyish-yellow, covered with pale yellow dust and a little whitish pubescence on lower part; generally with an indistinct dark middle line; ocellar triangle blackish. Antennal prominence duller yellow, translucent, bare shining, with a small black dot above base of each antenna. *Thorax* shining æneous with two greyish stripes on fore part, and an indefinite, very narrow median one; pubescence yellow, erect, fairly abundant, not conspicuous; humeral region, mesopleura and front part of

sternopleura with yellowish-grey tomentum; rest of pleuræ æneous-black, with yellowish dust and whitish pubescence; or the whole pleuræ may be yellow-dusted and with yellow pubescence. Scutellum translucent yellowish, base often slightly darker, with yellow pubescence on basal half, black long hairs towards and on margin, and a drooping fringe of yellowish-white hairs below extreme hind margin. *Abdomen* almost linear, slightly broader about the end of the 2nd segment; wholly orange, varying a little in shade, an indistinct blackish median spot on 1st segment united to a black stripe on hind margin; this does not reach the sides, but is continued on 2nd segment as a transverse basal band joined by a median stripe of varying width to a broad black band on hind margin, this latter band uniformly wide and reaching sides; 3rd segment with a narrow transverse line of uniform width (in Indian specimens), or narrowed to a point on each side and also interrupted in the middle (in European specimens), seldom reaching sides; hind margin with a black band as on 2nd segment; 4th segment similarly marked except that the hind marginal band leaves the extreme margin pale, and is slightly convex anteriorly or straight in some cases and practically or actually terminal; 5th segment orange with an indistinct small black spot above the middle. Pubescence following ground-colour, a few black tiny bristly hairs down middle of, and on orange part of, 4th segment. Venter pale yellowish, a black moderately wide band before the hind border on 2nd and 3rd segments. Genitalia orange and black. In the ♀ the abdominal black marks are rather more extensive. *Legs* rather long, slender, orange; coxæ and trochanters blackish, hind tarsi slightly darkened. Pubescence moderate, yellow; some blackish hairs behind middle femora beyond the middle, and on front side of hind femora near tip; some tiny bristles about tip of middle femora, and in front of and about tip of, hind femora, also about top and front of hind tibiæ. Basal joint of hind tarsi long. *Wings* nearly clear, subcostal cell and stigma very pale brownish-yellow; 3rd vein sinuate, straight; halteres orange.

Length, 8 to 11 mm.; dwarf specimens are by no means rare.

The above is partly based on Verrall's description of British, or at least European, specimens, and is partly from Indian examples. The abdomen is described as orange with black marks instead of *vice versâ* because it seems more natural. The chief difference in Oriental specimens, especially Indian ones, is that the narrow transverse lines on the 3rd and 4th segments are of more uniform width, more nearly attain the side margins, and are hardly ever interrupted in the middle, though they are sometimes bent just a little forward in their centres. Specimens from Shanghai and Hankow, China, more nearly approach the European form; and it is not at all uncommon to find Indian specimens with the two narrow transverse bands altogether wanting or practically so. De Meijere gives some interesting notes on the typical form and the two varieties, *nectarinus* and *alternans*.

Walker's *S. triligatus*, of which the type (a ♂) is still in very fair condition, varies only in the abdominal bands being rather broader and very black. The hind legs are missing.

S. balteatus is distinctly variable; in the variety *nectarinus* the face and frons are whitish, the facial stripe bluish-black. The ♀, even of the common Indian form, is sometimes tinged with bluish. The various exceedingly closely allied species from China, Borneo and Java (referred to by Verrall, but of which he only specifically mentions *nectarinus*, Wied.) are probably synonymous; I have generally adopted the principle that anything that *looks* like *balteatus*, *is balteatus*. It is not unusual for specimens to have a greyish-æneous space in front of the scutellum concolorous with and united to the grey dorsal stripes; viewed from behind this space is sometimes as large as the scutellum. Specimens with the narrow transverse abdominal bands distinctly reaching the side margins are common (sometimes one band does so and the other is shortened); and in one such ♀ from Peshawur (19. iii. 1913, *Howlett*) they are two-thirds as wide as the broad bands, the 5th segment having a large triangular spot attaining the front margin and the two hind corners, whilst the side margins of the abdomen are almost continuously black. A headless specimen from Pusa, 29. viii. 1912, has the three broad transverse abdominal bands distinct, but only a mere trace of the foreshortened narrow ones, the median stripe on the 2nd segment and the spot on the 5th both being absent.

This species is extremely common throughout the whole of the East in both hills and plains during the greater part of the warm weather. Its range includes all Europe, Madeira, Canaries, N. Africa, and Asia to Japan.

67. **Syrphus cinctellus**, *Zett.* (Pl. I, fig. 21.)

Scæva cinctella, Zetterstedt, Dipt. Scand. ii, p. 742 (1843).
Syrphus cinctellus, Verrall, Brit. Flies, Syrph. p. 392 (1901).

♂ ♀. *Head* in ♂ with eyes closely contiguous for a considerable distance; vertical triangle rather elongate, dark yellowish-grey with ruby-red ocelli and long black pubescence; frons and face shining chrome-yellow, former with a large semicircular black spot above antennæ and black pubescence; latter with fine pale yellow pubescence: facial bump shining, bare, brownish-yellow; mouth-border rather orange; proboscis black. Antennæ black, 1st and 2nd joints on lower side and 3rd on basal half below, brownish-orange. Occiput yellowish-grey, marginal fringe bright yellow, some black hairs intermixed behind vertex. In ♀, vertical space shining brassy-æneous, sometimes with a broad blackish stripe thence to the black spot above antennæ (in one specimen this stripe is reduced to the narrowest suspicion of a median line). *Thorax* brilliantly shining æneous, often with a brassy tinge; anterior corners towards sides, mesopleuræ, upper part of sternopleuræ and adjacent regions yellow-dusted; rest of

pleuræ and under side æneous-grey; scutellum brownish-yellow. Pubescence of dorsum and pleuræ yellow; of scutellum long and wholly black, except the dependent fringe from below hind margin. *Abdomen* conspicuously narrow, black and yellow to about an equal extent; ground-colour black; 1st segment shining yellow-æneous; 2nd with a pair of large yellow spots on side margins, clear of anterior and hind margins, more or less oblong, generally rather closer together behind than in front, sometimes more oval or roughly triangular; 3rd segment with a very broad yellow band from side to side, slightly emarginate in middle behind, leaving anterior margin of segment narrowly, and hind margin broadly, black; 4th segment similar, but with distinct orange hind margin; 5th segment orange with an indefinite, more or less triangular, blackish spot in middle. Pubescence of 2nd segment and side margins of abdomen long and yellow, but shorter and black for a short space on black parts of side margins: pubescence of black part of 2nd segment and of all dorsum after that quite short and black. Venter yellowish with long yellow pubescence, and blackish cross-bands more or less corresponding to the black colour on upper side. *Legs*: anterior femora all orange; hind femora with basal third orange and tips obscurely pale; hind tibiæ and tarsi black; under side of hind metatarsi orange, with bright yellow pubescence. All the obvious pubescence of legs yellow, sparse though long on under side of hind femora. *Wings* yellowish-grey; stigma yellowish; halteres and squamæ orange.

Length, 9 mm.

Described from a short series in my collection in perfect condition taken by myself at Darjiling on various dates from 15. v. to 8. vi. 1917; Darjiling, 12. vi. 1914 (*Gravely*); Thaumaspur, Nepal, 18–20. ii. 1908; Simla, ix. 1908 (*Nurse*). Widely spread in Europe.

68. **Syrphus corollæ**, *Fabr.*

Scæva corollæ, Fabricius, Ent. Syst. iv, p. 306 (1794).
Syrphus corollæ, Meigen, Syst. Beschr. iii, p. 304 (1822); Schiner, Fauna Austr. i, p. 306 (1862); Verrall, Brit. Flies, viii, p. 381 (1901).

♂ ♀ *Head* in ♂ with eyes contiguous for a short space; vertex black in front with black pubescence, on upper part narrowly yellowish-grey with yellow pubescence; frons and face bright shining chrome-yellow, former with black hairs extending downwards to each side of antennæ, below which the face bears fine pale yellow hairs; cheeks and mouth-border black; an indefinite black line from the latter to central bump or just above it. Antennæ black, under side more or less reddish-brown, arista black. Occiput yellowish-grey, marginal fringe bright yellow. In ♀, upper half of frons shining black, the colour dying away indefinitely, the space above base of antennæ more orange than in ♂ and with a pair of obliquely placed blackish lunules just

above. *Thorax* æneous, pleuræ moderately dark yellowish or æneous-grey, shining; scutellum brownish-yellow, all with dense brownish-yellow pubescence; rather paler on pleuræ. *Abdomen* black; 1st segment shining æneous; a pair of rather large, oval, well separated yellow spots across centre of 2nd segment, distinctly passing over side margins near upper corners; 3rd and 4th segments each with a pair of large, oval or oblong spots with rounded corners filling most of the surface, passing at their upper corners more or less broadly, but always distinctly, over side margins; the spots often joined in median line in ♂ narrowly or broadly; never so joined in ♀. These spots lie more broadly on anterior margin of 4th segment than on 3rd, being in some individuals just clear of margin on 3rd segment; when this is the case they are generally more broadly united on 4th than on 3rd segment, as in some individuals they may form a pair of spots on 3rd segment whilst united as a distinct band on 4th. Hind margin of 4th segment orange; 5th segment orange, indistinctly darkened in middle. Genitalia large, shining black above, orange below. Pubescence of abdomen following ground-colour; pale on 1st segment and anterior corners of 2nd; black on side margins from hind part of 2nd segment to tip; pale yellow on genitalia. Venter yellowish with indistinct black markings, pubescence pale. *Legs* orange; basal half of anterior, and two-thirds of hind, femora, black; hind tibiæ indistinctly darker on outer side; tarsi brownish or blackish, paler basally; pubescence mainly pale yellow, some short black pubescence behind femora and (in addition) below hind pair and on hind tibiæ. *Wings* practically clear; stigma yellowish; halteres orange.

Length, 7–7½ mm.

Described from five ♂ ♂ in good condition in my collection, taken by me at Darjiling, 6900 ft., 2. vi.–15. v. 1917, also a ♂ and two ♀ ♀ in Indian Museum from Shanghai, i. v. 1906 (*Brunetti*). There seems no doubt of the identity of this common European species, the Oriental examples agreeing practically throughout with Verrall's description. Its range includes all Europe, Madeira and Canaries, N. Africa, Asia to Japan, and perhaps N America.

69. Syrphus luniger, *Meig.*

Syrphus luniger, Meigen, Syst. Beschr. iii, p. 300 (1822); Verrall, Brit. Flies, Syrph. p. 385, fig. 298.

♂ ♀. *Head*: face and frons orange-yellow, a blackish stripe on lower half of former, cheeks blackish; often a small black spot above each antenna. Antennæ brownish-black, under side more or less reddish-orange; arista yellowish. Vertex shining black, with blackish pubescence. Pubescence of frons black, extending at sides to below antennæ. Occiput rather prominent, whitish-grey, with whitish pubescence. Frons in ♀ glittering blue-black on upper third, with large side dust-spots filling most of remainder

except a small shining lunule below middle of frons; a small dark spot above each antenna. Pubescence of frons black, absent above antennæ; that of occiput pale yellow, conspicuous. *Thorax* shining æneous, slightly tawny at sides, with pubescence yellow, longer and darker at sides and on pleuræ; scutellum brownish-orange, pubescence black on disc, pale at base and tip. *Abdomen* dull black, shining at base and tip, and also on the rather flattened margin, and on the hind margin of 3rd segment. Three pairs of large well separated orange spots or lunules; hind margins of 4th and 5th segments orange. Basal spots not lunulate, somewhat oval, slightly curved, inner ends bluntly pointed, outer ends narrowed, not quite reaching side margins; 2nd pair of spots larger and lunulate, their inner ends rather nearer the front margin than their outer ends, always clear of side margins; 3rd pair similar, slightly smaller and less lunulate; hind margin of 4th segment rather broadly orange; 5th segment mainly, sometimes almost wholly orange; margin of abdomen normally black except at tip. Pubescence mainly following ground-colour. Genitalia inconspicuous, black and partly orange, dusted. In ♀, spots smaller, 3rd pair more lunulate, disc of 5th segment mainly black; venter orange, a black spot in middle of each segment. *Legs* mainly orange; anterior femora blackish on about basal third, hind pair on basal two-thirds; slight traces of an obscure ring on the tibiæ; tarsi blackish, except at base. Pubescence moderate, mostly black; pale hairs intermixed behind anterior femora, and pale tiny bristles on inner side of hind tibiæ near tip. *Wings* nearly clear; subcostal cell and stigma pale brown; halteres and squamæ yellow or orange.

Length, about 11 mm.

The above description is abridged from that of Verrall, as the only Indian specimen that I can refer undoubtedly to the species is a ♂ from Simla, 7000 ft., 12–13. v. 1913 (*Annandale*). The ♂ from Theog, Simla Hills, 27. iv. 1907 (*Annandale*), on which I wrongly introduced the species to the Indian Fauna, is *Lasiopticus seleniticus*, Meig. *S. luniger* is common in many parts of Europe, and is recorded from the Canaries.

70. **Syrphus latifasciatus**, *Macq.* (Pl. II, fig. 19.)

Syrphus latifasciatus, Macquart, Rec. Soc. Sci. Lille, p. 242 (1848); id., Hist. Nat. Dipt. i, p. 541 (1834); Verrall, Brit. Flies, viii, p. 371, fig. 292 (1901).
Syrphus affinis, Loew, Prog. Posen etc., p. 35 (1840); Palma, Ann. Accad. Aspir. Natur. Napoli, (3) iii, p. 51, pl. vi, fig. 5 (1863).
Syrphus excisus var., Schiner, Faun. Austr. i, p. 311 (1862).
Syrphus flaviceps, Rondani, Dipt. Ital. Prod. ii, p. 133 (1857).
Scæva abbreviatus, Zetterstedt, viii, p. 3136 (1849).

♂ ♀ *Head*: frons in ♂ yellow with long black pubescence; vertical triangle æneous-black, black-haired with some yellow

hairs on hinder part; face yellow, no median stripe but central bump sometimes a little darker; face with black pubescence; cheeks blackish-grey. Antennæ wholly reddish-brown, a little paler below, sometimes nearly all blackish, arista dark. Occiput grey, marginal fringe yellowish, paler below and deeper behind vertex; no long black hairs behind vertex. In ♀, frons gradually widening to level of antennæ, where it is distinctly more than one-third of the head; face gradually narrowing downwards; frons shining black with violet reflections and very dense short black pubescence; rest of frons and whole of face bright chrome-yellow, former with a little black pubescence but bare just above antennæ; face with almost invisible pale pubescence. *Thorax* shining æneous-black, side margins distinctly yellowish (at least in the ♀ before me); pleuræ æneous with yellowish tinge; underside æneous; scutellum bright yellow. Pubescence of whole thorax dense, bright yellow. *Abdomen* shining black; 1st segment, and hind margin of all segments broadly, with distinct though not strikingly conspicuous bluish tinge; 2nd segment with a pair of approximately triangular or oval, moderately large, distinct but not widely separated, yellow spots, placed slightly obliquely, their upper ends passing widely over the side margins near the anterior corners of the segments; 3rd and 4th segments each with a broad orange-yellow band just behind anterior margin, very slightly emarginate in front and deeply so behind, the band suddenly narrowed towards side margins where it passes narrowly over anterior corners of segment; hind margin of 4th segment narrowly orange; 5th segment orange with a rather small, more or less oval, blackish spot in centre; 6th segment entirely orange. Pubescence bright yellow on yellow spots of 2nd segment, very short and inconspicuous on rest of dorsum, pale yellow on the orange bands, practically all black elsewhere and along side margins except at base. Venter mainly blackish, yellowish towards margins; genitalia small. *Legs* orange-yellow. Fore femora in ♂ on basal $\frac{2}{5}$, in ♀ on less than $\frac{1}{4}$; middle pair in ♂ on basal $\frac{2}{5}$, in ♀ very narrowly; hind pair on basal $\frac{3}{5}$ in ♂ and not at all in ♀, black. Anterior tarsi practically bare, darker; hind tarsi brown above. Pubescence in ♂ mainly black behind anterior femora, with some pale hairs at base on middle pair; hind pair nearly bare; in ♀ practically all yellow, some stiff black hairs behind middle and hind femora; rest of pubescence in both sexes mainly pale, but black on hind tibiæ and tarsi. *Wings* pale grey; stigma pale yellowish; halteres orange; squamæ yellowish-white.

Length, 9–9½ mm.

Described mainly from a ♀ in good condition from Simla, 8000 ft., 26.v.1914 (*Capt. Evans*); the description of the ♂ being incorporated from Verrall. There is no doubt whatever of the identity. The species has several varietal forms in Europe, and extends to North America.

71. Syrphus fulvifacies, *Brun.*

Syrphus fulvifacies, Brunetti, Rec. Ind. Mus. viii, p. 161 (1913).

♂ ♀. *Head* (♀): eyes bare; frons twice as wide at level of antennæ (where it forms one-third of the head) as at vertex; all dull black, but with a brassy tinge for a short space below the black vertical triangle and above the antennal prominence; black hairs from vertex to antennæ; face wholly, from base of antennæ to lower margin, bright golden-orange, rather deeper on central knob, which is of moderate size; mouth black, but mouth-border yellow with a small black spot at extreme tip of snout; proboscis dark brown; face with a little short black pubescence on sides of prominence, the remaining surface with very soft pale yellow pubescence; antennæ dull black, basal two-thirds of under side of 3rd joint dull reddish-brown, arista black; occiput grey with a complete marginal fringe of uniformly-sized, bright yellow, scale-like hairs *. *Thorax* dull blackish, with soft pale brownish-yellow hairs, so fine and sparsely placed that the dorsum appears almost bare except towards and on the lateral margins, where it is bright golden-yellow and much thicker in texture and quantity. Pleuræ and wing-bases covered with similar hair; sides of thorax cinereous-grey; scutellum yellow, with rather copious long black pubescence. *Abdomen* ovate, black; a pair of elongate yellow spots in centre of lateral margins of 2nd segment, their inner ends rounded but well separated from one another; a yellowish band in middle of 3rd and 4th segments, only their anterior corners reaching side margins; these bands are emarginate in middle, more conspicuously so behind; both are of uniform width with the spots on the 2nd segment. Extreme posterior margin of 5th segment yellow. Pubescence of abdomen black, even on the yellow parts, but there is the usual amount of hair about the anterior corners, where it is bright yellow. Venter blackish, the yellow bands present about the same appearance as on the dorsum. *Legs*: coxæ, nearly all the basal half of anterior femora, all hind femora except tips, and rest of hind legs wholly, except basal third of their tibiæ, black; remainder of legs yellow, tips of anterior tarsal joints with a row of black bristles, giving a darkened appearance to these parts; anterior tarsi with short black bristly hairs below. Hind tibiæ with golden-yellow pubescence on inner side; hind tarsi with similar pubescence below. *Wings* clear, subcostal cell brownish-yellow; halteres yellow.

Length, 9 mm.

Described from a single ♀ (in the Indian Museum), Rotung, 26. ix. 1918. One ♂, Kashmir, 8000-9000 ft., vi. 1901 (*Nurse*).

This species is remarkably like the very common Palæarctic *S. ribesii*, L., and may possibly be a variety of it, unless the limits

* In ♂, vertical triangle as long as distance of contiguity of eyes; blackish, with yellow dust and pubescence; frons and face yellow-dusted, former with black hairs and with a shining black semicircular space above base of antennæ.

of that species are truly known. If so, it differs from *ribesii* by the hind femora being principally black. In this respect it resembles *vitripennis*, Meig., if this latter is really distinct. Verrall states of *vitripennis*, in comparing that species with his wonderfully correct description of *S. ribesii*, that its best specific distinction from the latter is "the scarcity of the tiny black bristles about the tip of the hind femora in both sexes." In *ribesii* these bristles are wholly yellow on all the femora except the middle pair (where they are black); in *vitripennis* they are all black and scarce. In the present form they are black and numerous. The hind tibiæ are all black except about the basal third, whereas in *ribesii* there is at most an obscure dark patch on the front side, and in *vitripennis* the tibiæ are wholly yellow. The present form is as distinct from both *ribesii* and *vitripennis* as these two are from one another, but it is still open to question whether the three forms are not merely three well-marked varieties of one species. There are so-called "species" in North America so near *ribesii* that further confirmation of their distinctness would be very satisfactory.

72. Syrphus æqualis, *Walk.*

Xylota æqualis, Walker, Ins. Saund., Dipt. i, p. 226 (1852).
Syrphus distinctus, Brunetti, Rec. Ind. Mus. xi, p. 211, pl. xiii, fig. 7, abdomen (1915).

♂ *Head*: frons, face and under side of head covered with pale orange-yellow tomentum, this being more dusky towards the frons; a broad median blackish stripe; frons with black hairs; vertex blackish with black hairs. Antennæ and arista wholly black. Back of head dark grey with short yellow hairs, some black ones behind the vertex. *Thorax*: blackish on dorsum, yellowish-grey at sides, mainly covered with brownish-yellow pubescence. Scutellum orange-yellow, with black hairs in the middle and yellowish-white ones on anterior and posterior margins and below the latter. *Abdomen*: blackish, 1st segment yellowish, hind margins of 2nd, 3rd and 4th segments pinkish-grey, with a rather narrow cross-band of the same colour across the middle of each, the first band narrowly interrupted; that of the 4th segment lying just below the middle. Dorsum of abdomen with rather thickly placed black hairs except on the 2nd segment, on the pale band on the 3rd and at the sides of the whole abdomen, where the pubescence is whitish-yellow. Venter blackish, yellowish at base and along the hind borders of the segments, covered with yellow or black pubescence according to the colour of the surface. *Legs*: anterior pairs principally orange-yellow; anterior femora black on about the basal half; hind legs principally black, knees broadly brownish-yellow as are the last four tarsal joints. Anterior femora with some moderately long yellowish or brownish-yellow hairs on under side, with black hairs intermixed towards tips of fore pair and generally on under side of middle

pair. Conspicuous thick but short black hairs on hind femora, longest on under side, and on front and hind sides of hind tibiæ. *Wings* yellowish-grey, stigma brown; squamæ yellowish-brown with fringe of the same colour.

Length, 14–15 mm.

The above redescription is from three perfect ♂ ♂ in the Indian Museum from Tolpani, Garhwal District, W Himalayas, 9500 ft., 23. iv.–13. v. 1914; Simla, x. 1911 (*Howlett*). The *type* ♂ in the British Museum agrees perfectly.

This is the most striking of the Oriental species known to me, the very conspicuous, dense black hair on the hind femora and tibiæ being quite unknown in any other. The pinkish and grey bands of the abdomen are also very characteristic. The species bears a close general resemblance to *S. griseocinctus*, but this latter is immediately recognised by the pubescent eyes and by the absence of the black hair on the hind legs.

73. Syrphus maculipleura, *Brun.*

Syrphus maculipleura, Brunetti, Rec. Ind. Mus. viii, p. 162 (1913).

♀. *Head*: frons at base of antennæ one-third of head, diminishing to half this width on vertex, where it is shining with a dark violet, æneous tinge; remainder of frons shining æneous-black, except for a narrow pale yellow eye-margin which joins the pale yellow face, on which is a broad shining black middle stripe from the base of the antennæ to the mouth; the small space between the roots of the antennæ yellow. Antennæ with 1st and 2nd joints brown, 3rd with upper half black and lower part dull reddish-brown. Frons with fine black hairs, face with sparse short fine yellow hairs. Proboscis black with yellow labella. Hinder orbit of eyes with whitish-yellow scaly hairs, back of head blackish-grey. In profile the head does not extend downwards below the level of the eyes. *Thorax*: bright shining æneous with a bronze tint, with short black or blackish-brown hairs; side margins of dorsum rather narrowly yellow. Scutellum with dull black (almost velvet-black) dorsum, the colour becoming dark brown on the hind margin; the extreme base is narrowly pale yellow; the surface covered with black hairs. Sides of thorax dull æneous or æneous-grey, with a small quantity of yellowish or yellowish-grey hair. A small oblong, pale yellow, inconspicuous, callus-like spot on each shoulder; a small similar spot on prothorax on each side just above the first pair of coxæ. Three elongate, similarly coloured, small spots placed in a curved line below and behind the wings, the lowest spot situated on the sternopleura. *Abdomen* elongate, of uniform width, about as long as head and thorax together, black; 1st segment yellow except a little blackish in the middle at the base; 2nd segment with a pair of elongate yellowish spots across the middle, their outer ends touching the lateral edges of the segment, their inner ends well separated; 3rd and

4th segments each with a slightly arcuate yellowish band, emarginate in middle on hinder side, placed just before middle of segment, and almost attaining lateral margins (or if reaching them in individual examples, the contact is practically only at a point). The 5th segment with two oval yellow spots diagonally from anterior border to each hind corner. Whole abdomen with fine short black hairs, sides also with black hairs; very little pale hair about anterior corners of the abdomen. Venter mainly yellowish; the black parts of the dorsum more or less duplicated below. *Legs*: anterior pairs pale yellow; an infuscated streak on upper side of fore femora and on outer side of fore tibiæ; middle femora and tibiæ similar, but the obscure mark on the tibiæ forms more nearly a median band. Fore tarsi all rich brown, middle tarsi black. Hind legs all black, except base of femora a little yellowish; rich golden-brown pubescence below hind tarsi. Pubescence of legs weak, pale yellow on anterior legs and black on hind pair. *Wings*: clear, iridescent; subcostal cell pale brownish-yellow; halteres yellow.

Length, 6 mm.

Described from one ♀ in the Indian Museum; Rotung, N.E. Indian Frontier, 25. xii. 1911.

This species might possibly be referred to *Xanthogramma*, as the side margins of the thoracic dorsum are distinctly though rather narrowly yellow. Yet the abdomen has not the flattened form characteristic of that genus nor is it at all marginate. The distinct yellow spots on the pleuræ are characteristic of *Xanthogramma*, but the whole facies of the insect is that of *Syrphus*.

74. **Syrphus confrater**, *Wied.* (Pl. II, fig. 17.)

Syrphus confrater, Wiedemann, Auss. Zweifl. ii, p. 120 (1830).
Syrphus cranapes, Walker, Ins. Saund., Dipt. pt. 3, p. 231, ♂ ♀ (1852).
Syrphus mundus, id., op. cit. p. 230, ♂ (1852).
Syrphus trilimbatus, Bigot, Ann. Soc. Ent. France, (6) iv, p. 86 (1884).

♂ ♀ *Head*: in ♂, eyes bare; front facets only microscopically a little larger than others; vertical triangle dark grey with black hairs; actual vertex very small, yellow-dusted, with yellow hairs; frons and face yellowish, former rather more orange with erect yellow hairs on upper part and black ones on remainder; face more whitish below, wholly covered with whitish tomentum and pale yellowish hairs; central bump shining brownish-yellow, pubescent; lunular spot orange-brown. Antennæ brownish-orange, darker on upper side; arista dark brown, paler at base. Occiput with yellowish-grey tomentum and an entire fringe of hairs which are yellow behind vertex, the remainder whitish. In ♀, face below antennæ one-third width of head, less than half this width at vertex; ocellar triangle dark, with a violet tinge; frons with yellowish-grey tomentum and short fine black hairs. Dark brown lunular region more extensive than in ♂. *Thorax*: dorsum steely-æneous (a little more brassy in

♂), with dense bright yellow soft pubescence; sides similar but less shining and the pubescence more whitish; extreme side margins of dorsum from suture to wing-base a little tinged with shining yellowish. Scutellum normally almost translucent yellowish, often with middle part more or less indefinitely darker; pubescence black, erect, fine and rather dense, but there is a narrow band of pale yellow hairs on the anterior margin and a fringe of yellow hairs pendent from below the hind margin. Metanotum steely-æneous. *Abdomen*: 1st segment mainly blackish, narrowly yellow at sides; rest of surface pale shining blackish. A pair of irregularly oval or sometimes almost diamond-shaped spots placed not quite in a straight line on 2nd segment, their inner ends more or less narrowed but practically always meeting rather broadly, their outer ends much narrowed behind, not quite reaching anterior corners of segment; 3rd segment with a broad yellow band placed fractionally above exact centre of segment, filling more than one-third of it, curving slightly forward at sides and considerably narrowed on the actual side margins; a similar broad band on 4th segment just behind anterior margin, curving very slightly forwards towards side margins, which latter are just reached; 5th segment brownish-yellow with an indefinite blackish space in centre. Pubescence of abdomen mainly following ground-colour, but some of the black pubescence overruns the yellow parts. Venter pale yellow, with soft whitish pubescence. *Legs* all orange-yellow except the dirty dark brown coxæ, also extreme base of anterior femora and 2nd, 3rd and 4th joints of anterior tarsi, which are more or less brown; 5th tarsal joint orange. All femora sometimes narrowly black at extreme base. Hind femora often indefinitely brownish about the middle; hind tibiæ generally with apical half more or less brownish; the dark parts on both femora and tibiæ bear microscopic stiff black hairs, which heighten the impression of dark coloration; hind tarsi mainly dark brown. *Wings* clear; subcostal cell rather dark yellowish-brown; squamæ pale yellowish-grey with yellow fringes; halteres pale yellow. In ♂, wing generally a little yellowish-brown about the middle and anterior margin, basally.

Length, 8–11 mm. One ♂, from the Khasi Hills, is 14 mm.

Reported as feeding on Aphides on cotton, wheat, cabbages and chrysanthemums. Described from about thirty of both sexes mainly from Pusa, where it seems common from the end of January to about the end of March. Generally distributed: Patna District, Bengal, ii. 1906, on mustard; Ferozepore, iii. 1898, and Simla, viii. 1908 (both *Nurse*); Chapra, Bengal (*Mackenzie*); Jorhat, Assam, 26. xii. 1907 ("C. 653, L."); Dumpela to Cherrapunji, Khasi Hills, 26. iii. 1906. A series, mostly ♀♀ in British Museum from the Khasi Hills, lower ranges, 1878 (*Chennell*), including a ♂ 14 mm. long. This specimen may possibly belong to another species, the differences being the more distinct, very broad black median band on the hind femora and

the brownish costal cell, though both characters are merely normal ones intensified. The size is unusual, though there is an intermediate-sized ♀ about 12½ mm. long in the British Museum from Coonoor, S. India.

Wiedemann described the femora as black at the extreme base, but this seems the exception rather than the rule. Walker's *cranapes* is synonymous, the synonymy having been kindly confirmed for me (*in litt.*) by Mr. Edwards, though I have since examined the type, a ♀. *S. mundus*, Walk., is, judging by the unique type ♂ in the British Museum, from India, also synonymous. A comparison of Bigot's type of *trilimbatus* (♂) proves this also to be identical.

Three ♂ ♂ in the British Museum apparently represent an undescribed species with the general facies of *confrater*, but differing in the important character of possessing distinctly pubescent eyes. The anterior femora have the basal third or more black, the hind pair have the major portion blackish, with paler bases and tips, and the apical half of the hind tibiæ are black or blackish. Taken in company with the 1 ♂ and several ♀ ♀ in the same collection recorded above from the Khasi Hills (*Chennell*).

Type: the species was described by Wiedemann from Trentepohl's collection, from New Guinea, and is also recorded from Sumatra and China.

75. **Syrphus assimilis**, *Macq.*

Syrphus assimilis, Macquart, Dipt. Exot., Suppl. 1, p. 135 (1846).

"♂. Near *S. ribesii*. Face yellow, with whitish tomentum, central bump yellow. Front wholly black, with grey tomentum. Antennæ with first two joints tawny (3rd missing). Scutellum yellow. Under side of thorax between fore and middle legs green. Abdomen with broad yellow complete bands on hind borders of segments, each slightly overlapping the following segment. Venter wholly yellow. Legs yellow, fore legs brown, including tarsi. Wings a little yellowish, mediastinal cell yellow; venation as in *ribesii*.

"India. Bigot collection. Length 5½ lines."

Genus **XANTHOGRAMMA**, *Sch.*

Xanthogramma, Schiner, Wien. Ent. Monatschr. iv, p. 215 (1860).

GENOTYPE, *Syrphus ornatus*, Meig., as *Musca pedissequua*, Harr.; by Williston's designation.

Differing from *Syrphus* in the conspicuous yellow side lines to the thorax and distinct yellow markings on the pleuræ. Eyes quite bare. Abdomen relatively flat, about as broad as thorax,

and normally much shorter than in its nearest ally *Sphœrophoria*; also normally marginate.

Range. Europe, North America, India.

Life-history. The larvæ are said to live in earth-heaps and in turf. Lundbeck (Dipt. Danica, v, p. 355 (1916)) doubts Brauer's suggestion that they are found in ants' nests.

Xanthogramma and *Sphœrophoria* are clearly very closely related, and their separation rests mainly on comparatively arbitrary characters.

In Kertész' Catalogue of Palæarctic Diptera, *S. scutellaris** is referred to *Xanthogramma*, though *javana*, Wied., is retained under *Sphœrophoria*. As a matter of fact, both *scutellaris* and *javana* are to some extent intermediate between the two genera. *Xanthogramma* is characterised by a broad flat abdomen, as compared with the long narrow abdomen of *Sphœrophoria*. Schiner separated the two also by the 5- or 6-segmented abdomen and inconspicuous ♂ genitalia in the former, as compared with the 7-segmented abdomen with prominent ♂ genitalia in the latter. To these characters Verrall adds the marginate edge of the abdomen in *Xanthogramma*. When the principal European species of *Xanthogramma* (*citiofasciatum*, *ornatum* and *dives*) are compared with the common European *Sphœrophoriæ*, their separation on the width of the abdomen is easy enough, but the two Oriental species in question break down the barrier between them. *Scutellaris* has a 5-segmented abdomen in the ♂ with prominent genitalia, a 6-segmented abdomen in the ♀, the abdomen being moderately marginate in both sexes. In *javana* the abdomen occasionally is a little marginate, and is 5-segmented in both sexes (♂ genitalia not prominent), but in one ♀ six segments can be distinctly seen.

As regards facies, *javana* has much more the appearance of a *Xanthogramma* than has *scutellaris*, the yellow and black colours being very sharply defined. My *Syrphus maculipleura* may be a *Xanthogramma*, as noted under the description of the species.

76. **Xanthogramma citrinum**, sp. nov. (Pl. II, fig. 20.)

♂ ♀ *Head*: vertical triangle in ♂ very small, black with black hairs and ruby-red ocelli; eyes closely contiguous for a considerable distance; upper and middle facets enlarged nearly as much as in *Lasiopticus*; frons and face orange-yellow, a large triangular space above antennæ more brownish-orange; frons with moderately thick short black pubescence; face with very sparse pale yellow pubescence; mouth-border narrowly rather orange; proboscis black and orange. Antennæ brownish-orange, upper side darker. Cheeks pale orange. Occipital margin yellowish-grey with yellow fringe and (in ♂ only) black short

* Since writing the above I have learned of the genus *Ischiodon*, erected by Sack for this species; see below, p. 97.

hairs behind vertex. In ♀, head deep chrome-yellow, vertex rather narrowly black, the colour carried very narrowly a little way down eye-margins; pubescence of frons much less dense on upper part, that of face extremely fine, almost invisible. *Thorax*: dorsum moderately shining black, with (especially in the ♀) a deep blue reflection in certain lights; in addition, centre of dorsum from anterior to hind margin narrowly dusted with greenish-grey, in which (in ♀) traces of a pair of narrow median brownish stripes can be seen in perfect specimens. Side margins broadly and conspicuously orange-yellow from humeri to scutellum. Sides of thorax black, with two squarish yellow spots immediately below the humeri, thus forming three subequal spots in a vertical row; a large, oblong spot, placed vertically, on mesopleura, connecting the side marginal stripe of the dorsum with a horizontal one on the sternopleura, which latter spot is contiguous with two others (forming a slightly curved row of three), more or less oblong, the last one lying just behind and below the wing-base; all the spots very clear cut and bright orange-yellow. In ♀ they are considerably fused, mainly through the large size of the mesopleural spot, which extends to nearly all the others, so that the whole sides of the thorax are practically unicolorous, leaving only the lower surface of the thorax black. Pubescence of thorax brownish-yellow on dorsum, bright yellow or orange-yellow towards sides, paler yellow on pleuræ; some stiff black hairs on hind corners of dorsum. Scutellum deep lemon-yellow, more or less translucent and often with centre darkened; pubescence wholly black, long and copious. Pubescence of dorsum of thorax in ♀ blackish-brown. *Abdomen* moderately shining black, with a pair of well separated orange-yellow spots on 2nd segment, elongate, rather curved, the inner ends rounded, the outer ends passing their full width over side margins on anterior corners; 3rd and 4th segments with an unbroken yellow band on each, barely appreciably emarginate in middle on both front and hind sides; each spot lying across centre of segment and passing its full width over side margins; the second one of the bands placed a trifle nearer the front than the hind margin and very slightly widening on side margins; 5th segment mainly orange, but with a black triangle in middle of hind margin in ♂, and with hind margin all black in ♀. Pubescence of abdomen wholly black except at sides near the base, where it is long, copious and yellow. Venter yellowish, blackish towards tip. Genitalia in ♂ dull orange with long black pubescence. *Legs* orange-yellow. Hind femora on apical half, hind tibiæ and all tarsi, black; under side of hind metatarsus with golden-yellow pubescence. Pubescence of legs mainly confined to a little soft, pale yellow hair behind and below the anterior femora and the basal half of hind pair; black hairs on black parts of hind legs. *Wings* pale yellowish-grey; stigma brownish-yellow; halteres orange.

Length, 9–12 mm.

Described from two ♂ ♂ and two ♀ ♀ in the Indian Museum and one ♂ in the Pusa collection. Mangaldai, Assam–Bhutan Frontier, 26.xii.1910, *type* ♂ (*Kemp*); Ukhral, Manipur, 6400 ft., viii. 1908 (*Pettigrew*); Sadiya, Assam; Ghumti, Darjiling District, 4000 ft., vii. 1911, *type* ♀ (*Gravely*); Sidapur, Coorg, S. India, 8000 ft., 15. iii. 1917. An additional ♂ from Janakmukh (Abor Expedition), 600 ft., 18. xii. 1911 (*Kemp*), in the Indian Museum, has a shining blackish-brown triangle over the antennæ, a distinct, similarly coloured stripe on the face from the root of the antennæ to the mouth, and the hind legs all blackish-brown. It may possibly represent a different species.

Genus **ISCHIODON**, *Sack.*

Ischiodon, Sack, Ent. Mitt. ii, p. 5 (1913).

GENOTYPE, *Sphœrophoria scutellaris*, F ; as *trochanterica*, sp. nov.

The principal character distinguishing this genus is the presence of an almost stick-like slender tooth on the under side of the hind trochanters. In all other respects the characters are those of *Sphœrophoria*. It is strange that this fact has not been noticed before, considering the wide distribution and abundance of the species. These processes are present in both sexes. But though the genus is a good one, Sack's supposed new species is certainly synonymous with *scutellaris*.

77 **Ischiodon scutellaris**, *Fabr.*

Scæva scutellaris, Fabricius, Syst. Antl. p. 252 (1805).
Syrphus scutellaris, Wiedemann, Auss. Zweifl. ii, p. 130 (1830).
Sphœrophoria scutellaris, de Meijere, Tijd. v. Ent. li, p. 288, ♂ ♀ redescr. (1908); id., op. cit. lvii, p. 164 (1914); Brunetti, Rec. Ind. Mus. xi, p. 217 (1915).
Syrphus ægyptius, Wiedemann, Auss. Zweifl. ii, p. 133 (1830).
Syrphus coromandelensis, Macquart, Dipt. Exot. ii, 2, p. 89 (1842).
Syrphus longicornis, id., t. c. p. 94, pl. xvi, fig. 5 (1842).
Syrphus fuscotibialis, id., t. c. p. 94, pl. xvi, fig. 4 (1842).
Syrphus nasutus, id., t. c. p. 96, pl. xvi, fig. 6 (1842).
Syrphus natalensis, id., op. cit. Suppl. i, p. 134 (1846).
Sirphus splendens, Doleschall, Nat. Tijd. Ned. Ind. x, p. 410, pl. i, fig. 3 (1856).
Syrphus brachypterus, Thomson, Eugen. Resa, Dipt. p. 496 (1869).
Syrphus erythropygus, Bigot. Ann. Soc. Ent. France, (6) iv, p. 511 (1884).
Syrphus pfeifferi, Bigot, Ann. Soc. Ent. France, (6) iv, p. 89 (1884).
Melithreptus novæ-guineæ, Kertész, Term. Füzet. xxii, p. 178, fig. 3 (1899).
Ischiodon trochanterica, Sack, Ent. Mitt. (Berl.) ii, p. 6 (1913).
"*Syrphid fly*," Ind. Ins. Life, pl. lxiv.; South Ind. Ins., pl. xv.

♂ ♀. *Head*: in ♂, eyes contiguous for barely half the distance from frons to the black isosceles vertical triangle, which is black with a little blackish pubescence; only the most frontal facets are larger than the rest; frons and face bright sulphur-yellow, latter

with parallel sides, smooth, shining, with a little pale, microscopic pubescence; face in profile showing only the slightest concavity above the central bump; proboscis black. Antennæ from brownish-orange to yellow; upper side of first two joints blackish-brown; 3rd joint twice as long as broad, more or less brownish on upper side and at tip; arista bare, orange, tip black. Occiput black, side margins with whitish tomentum and pubescence; upper margins yellow with yellow pubescence. In ♀, frons rather more than one-sixth of the head at vertex, widening gradually to level of eyes where it is twice as wide; a large square black spot on vertex from eye to eye; and a median, gradually widening, very shining, black stripe of varying width extending thence to two small shining black lunate calli, barely raised above level of frons, placed just above base of antennæ. *Thorax*: dorsum shining æneous-black from anterior to hind margin; side margins broadly bright yellow or yellowish-white from shoulder to behind wing-base, where the colour narrows and dies away. Pleuræ shining black, with a large median yellowish-white callus from top

Fig. 17.—*Ischiodon scutellaris*, Fabr., ♀.

to bottom of mesopleura, contiguous to a horizontal oval similar callus on sternopleura, both spots bearing white pubescence. Scutellum yellowish, the centre often more or less brownish. Pubescence of thorax and scutellum greyish or pale yellow. Metanotum shining black. *Abdomen* moderately shining black. 2nd segment with a large sulphur-yellow spot on each side, each spot narrowed and rounded on its inner end; the spots vary a little in width, the median black line sometimes being very narrow or indefinite. 3rd and 4th segments with a broad yellow band on each, reaching sides, slightly arcuated and generally very slightly narrowed in middle, especially that on 4th segment; the bands are placed very near the anterior margin, leaving the base very narrowly black and the hind margin more broadly so, though occasionally the extreme hind margin may be pale. 5th segment black, orange towards sides, or sometimes the greater part orange. Abdomen with a little pale pubescence towards sides of 2nd segment, rest of side margins with just perceptible pale pubescence, that on remainder of dorsum microscopic. Venter mainly

yellowish. *Legs* yellow; a moderately broad subapical black ring on hind femora, less distinct in ♀; an indefinite median brown ring on hind tibiæ; tips of all tarsi blackish. *Wings* clear; squamæ large, greyish-white, with yellowish margins and long white fringes; halteres yellow.

Length, about 8 mm.

There is little doubt that *coromandelensis*, Macq., is synonymous; the green thorax mentioned by that author is almost paralleled by the greenish æneous tinge which is not uncommon in individuals in this genus. Moreover, he states that the 3rd antennal joint is elongate, which is one of the strongest characters of *scutellaris*. A comparison of Bigot's type of *Syrphus erythropygus* ♂ proves this also to be conspecific The species is common in many parts of India and Assam practically all the year round, and is one of the most widely distributed Syrphids in the East. It is also common in Northern Africa and other parts of that continent. The species has been bred more than once from larvæ predaceous on Aphidæ on chrysanthemums and watermelons.

Genus **SPHÆROPHORIA**, *St Farg. et Serv.*

Sphœrophoria, St. Fargeau et Serville, Encycl. Méthod. x, p. 513 (1825); Brunetti, Rec. Ind. Mus. xi, p. 212, notes on Oriental species (1915).

Melithreptus, Loew, Programm. Posen, p. 27 (1840), and Isis, viii, p. 577 (1840).

Melitrophus, Walker, Ins. Brit., Dipt. iii, p. xxi (1856).

GENOTYPE, *Musca scripta*, L.; by Rondani's designation, 1844.

Head as broad as or broader than thorax, much broader than long, mainly yellow; eyes bare, contiguous in ♂ for a short distance, distinctly separated in ♀; face not prominent; antennæ rather short, with 3rd joint oval or somewhat elongate; arista short, bare. *Thorax* distinctly broadest behind the middle, blackish or æneous, side margins and greater part of pleuræ distinctly yellow. Scutellum semicircular, always yellow. *Abdomen* with five distinct segments in ♂ apart from the genitalia, and at least 6, often 7 or even 8, in ♀; twice as long as thorax or even longer, narrow, frequently linear, tip generally rather clubbed in ♂; black, with yellow bands or spots. Genitalia large. *Legs* simple. *Wings* with practically the venation of *Syrphus*.

Life-history. The larvæ are aphidiphagous, several European species having been bred.

Range. Europe, North and South Asia, Orient, North Africa, Australia, North America and Greenland.

A natural group, in which the species shew a remarkable tendency to form races; in Europe, North America and India this is equally the case. Any change in the generic name is resented by Verrall (Brit. Flies, Syrphidæ, p. 427)

Table of Species.

1.	Hind femora more or less blackish on apical third; hind tibiæ black or blackish on basal and apical thirds; rest of legs yellow. (Face with black median stripe in ♀, sometimes brown in ♂)	*javana*, Wied., p. 100.
	Legs wholly yellow except for apical darkening of tarsi in some forms. ..	2.
2.	Face with distinct black median stripe; thorax æneous or greenish, without sign of greyish median stripes	*viridæenea*, Brun., p. 101.
	Face unstriped, thorax nearly always with two more or less distinct greyish median stripes on at least anterior portion	*indiana*, Big., p. 102.

After reconsidering the forms of this genus of which Oriental specimens are available, it has seemed advisable, in order to avoid unduly multiplying such "forms," to unite all except *javana* and *viridœnea* under a single species. This latter may be a variety (with wide variation within its own limits) of the common *scripta*, L., of Europe; and as it corresponds with Bigot's description of his *indiana*, this name is adopted here. The only other species described from the East is Macquart's *bengalensis*, but as he definitely allies his species with *menthastri*, L. ("*tœniata*, Meig."), the preference is given to Bigot's name.

78. Sphærophoria javana, *Wied.*

Syrphus javanus, Wiedemann, Anal. Ent. p. 34 (1824); id., Auss. Zweifl. ii, p. 137 (1830).

Sphærophoria javana, de Meijere, Tijd. v. Ent. li, p. 290, notes (1908); Brunetti, Rec. Ind. Mus. xi, p. 217 (1915).

♂ ♀ *Head*: eyes in ♂ contiguous for fully half the distance from vertex to frons; front facets just perceptibly larger than the others; vertical triangle rather elongate, black, with black hairs; frons and face shining yellowish, closely covered with bright yellow dust and very fine yellow, almost imperceptible, pubescence; central bump rather large, shining yellowish to æneous, a little darker in centre. Upper side of small antennal prominence shining black. Antennæ orange, 3rd joint as broad as long, upper side blackish; arista orange. Rest as in *Ischiodon scutellaris*. In ♀, frons as in *I. scutellaris*; vertex with violet or sometimes shining bronze reflections; frontal stripe wider than in *I. scutellaris*, with dark brown pubescence; broader on lower part; face with a broad median black stripe. *Thorax* as in *I. scutellaris*. Scutellum with *black* pubescence. *Abdomen*: 1st segment yellow; 2nd segment much as in *I. scutellaris*, but spots sometimes oblong with inner ends rounded, sometimes subtriangular, sometimes narrow and elongate, their inner ends almost touching. The yellow bands on 3rd and 4th segments are placed nearer the centre than in *I. scutellaris* and are generally rather narrower; 5th

segment black, with an indefinite arched pale band, or mainly orange-yellow with an indefinite black mark about the base. Venter blackish, pale bands corresponding to those on dorsum more or less definite. Pubescence of dorsum black, except on spots and sides of 2nd segment, where it is yellow. *Legs* yellow with about apical third of hind femora, also basal and apical third of hind tibiæ, black. Rest as in *I. scutellaris*.

Length, 7–8 mm.

Apart from the absence of processes on the hind trochanters, the shorter 3rd antennal joint, the black-haired scutellum and the black in the hind tibiæ distinguish this species easily from *Ischiodon scutellaris*, and the latter character from all other Oriental species of *Sphærophoria* known to me.

Coorg, S. India, 15–20. x. 1915 (*Fletcher*); above Tura, Assam (*Kemp*). Numerous other specimens (data not recorded) have come before me. Described by Wiedemann from his own and Westermann's collections, from Java; also recorded from Ceylon, Sumatra and New Guinea.

79. **Sphærophoria viridænea**, *Brun.* (Pl. III, figs. 7, 8.)

Sphærophoria, "form 4," *viridænea*, Brunetti, Rec. Ind. Mus. xi, p. 216 (1915).

♂ ♀ *Head* yellow. In ♂, a small black triangle immediately above base of antennæ, joined to a broad black shining median stripe on face, one-third of the width from eye to eye and continued very narrowly along extreme lower margin of cheeks. Antennæ orange with about upper half brown, or wholly brown, arista brown; proboscis blackish, occipital fringe whitish. In ♀, vertex dark æneous or shining black, with a broad black stripe running thence to base of antennæ, the stripe both on frons and face varying in width in individuals. *Thorax* dark æneous-green without signs of greyish stripes; pubescence varying from yellow to brown. Distinct large callus-like yellow spots on humerus, side margins of dorsum to suture, mesopleura and sternopleura, all contiguous; one such spot also on propleura, and behind wing-roots. Rest of ground-colour of pleuræ shining blackish or æneous. Scutellum all yellow with pale yellow pubescence. *Abdomen* black; 2nd, 3rd and 4th segments with a median yellow band of uniform width, but very much broader in ♂, occupying the greater part of the latter two segments; 5th in ♂ orange-brown, middle of hind margin narrowly excised; in ♀ mainly black, but the anterior corners broadly yellow. Genitalia in ♂ entirely orange-brown, in ♀ black. Venter mainly yellowish. Pubescence of abdomen all pale and short except towards sides at base. *Legs* yellow, hind tarsi brownish, pubescence of legs pale yellow. *Wings* as long as abdomen, quite clear; stigma brownish; halteres bright orange.

Length, about 7–8 mm.

Redescribed from a ♂ and two ♀ ♀ in good condition in the Indian Museum. Darjiling, 7000 ft., 26–28. v. 1917, ♂. 15–19. v. 1917, ♀ (both *Brunetti*); Kurseong, 5000 ft., 4. ix. 1909 (*Annandale*). Previously described from specimens from Simla, 16. v. 1909; Theog, 2. v. 1907 (*Annandale*), and from Kurseong.

There can be little doubt that this is a valid species, the black-striped face separating it from the other forms common in India, all of which I have here united under *indiana*, Big., and the entirely yellow legs separating it from *javana*, Wied., which is the only other species with a black-striped face. The ♂ described above has the tips of the hind femora darkened, also the hind tibiæ, but I do not regard it as intermediate. The species is of the very narrow type characteristic of the genus, whereas *S. javana* and *Ischiodon scutellaris*, F., are distinctly broader, approaching the narrower species of *Syrphus* in the *cinctellus* group.

80. **Sphærophoria indiana**, *Big.* (Pl. III, figs. 1–6.)

Sphærophoria indiana, Bigot, Ann. Soc. Ent. France, (6) iv, p. 99 (1884).

♂ ♀. *Head* whitish-yellow to pale orange-yellow, including antennæ; latter generally brownish above or towards tips; proboscis blackish; occipital margin with whitish fringe; vertex in ♂ small, black, shining. Frons in ♀ yellow with a median rather broad shining black stripe joined to the all-black vertex; proboscis blackish. *Thorax*: dorsum dull to moderately shining æneous-black, with, at least on anterior part, two median greyish stripes generally perfectly obvious in fresh specimens. Pleuræ shining black with yellow spots as in *viridæenea*. Scutellum wholly yellow; pubescence of both dorsum and scutellum pale yellow. *Abdomen*: 1st and 2nd segments black, latter with a median yellow band of uniform but varying width; remaining segments sometimes mainly yellow and sometimes principally black; in the latter case the anterior and hind parts of each segment are black; in many specimens the abdomen after 2nd segment, including genitalia, is wholly yellow or orange-yellow. Venter mainly yellowish; pubescence of abdomen mainly yellow basally, and towards sides, and on venter, but considerably black on black parts. ♂ genitalia with long yellow pubescence. *Legs* all yellow; tarsi varying from wholly yellow to wholly moderately dark brown; pubescence of legs yellow. *Wings* clear, stigma yellowish or brownish; halteres yellow.

Length, generally 6–7 mm., but probably variable.

The very common Indian species referred to here as *indiana*, Big., seems universally distributed throughout India, occurring mostly from December to May, and in September, which causes me to think it may be two-brooded. Common in the Western Himalayas, apparently rather less so in the Eastern ranges, but found in Nepal. Very abundant at times (Agra and Ferozepore,

iv. 1905, *Brunetti*) in fields of dry grass. Found in the Bombay Presidency and as far south as Bangalore. I took it at Shanghai, 17. iv. 1906. All the dates and localities previously recorded by me of my "Forms 1, 2, 3" apply to this species.

Type in Bigot's collection.

Genus **ERIOZONA**, *Sch.*

Eriozona, Schiner, Wien. Ent. Monatschr. iv, p. 214 (1860).

GENOTYPE, *Scæva syrphoides*, Fallén; by original designation.

Head semicircular, a little broader than thorax; eyes distinctly pubescent, contiguous for some distance in ♂, wide apart in ♀ Face broad, pubescent or bare, central bump present; sometimes (*E. analis*, Kert.) the whole lower part of the face down to the mouth-border is conspicuously prominent. Proboscis rather prominent, moderately long, labella large; palpi elongate, filiform, cuneiform at tip. Antennæ pendent, moderately long; 3rd joint rounded, ovate or twice as long as 1st and 2nd together; arista bare. *Thorax* varying from a little broader than long to a little longer than broad, moderately arched, pubescent. *Abdomen* short-oval, nearly rounded; at its widest part wider than thorax, gently

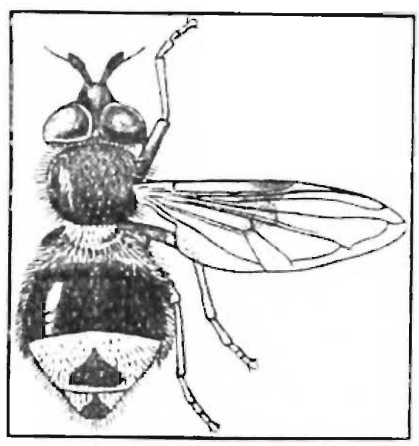

Fig. 18.—*Eriozona analis*, Kert., ♀

arched and curved. *Legs* moderately long and strong; all femora sometimes rather elongate, but not specially so in the two Oriental species; tibiæ rather curved, tarsi broad, pulvilli well developed. *Wings* with normal Syrphine venation, with a large brown patch across the middle; anterior cross-vein much before middle of discal cell.

Range. One European species (*E. syrphoides*) and two from India are all that are known.

The above description is based on Schiner's, modified to enable the genus to receive the two Oriental species, which from their peculiar facies should undoubtedly be included in it One of

these, *himalayensis*, possesses eye-margins to the face, like those in *Chilosia*.

Third antennal joint 2½ times as long as deep; ground-colour of 3rd and 4th abdominal segments orange; pubescence of 1st and 2nd abdominal segments (except at corners of 1st), black	*analis*, Kert., p. 104.
Third antennal joint no longer than deep; ground-colour of 3rd and 4th abdominal segments dull æneous; pubescence of abdomen all yellow or orange-red, except at sides of 3rd and 4th segments.	*himalayensis*, Brun., p. 105.

81. **Eriozona analis**, *Kert.*

Eriozona analis, Kertész, Term. Füzet. xxiv, p. 414 (1901).
Eriozona ruficauda, Brunetti, Rec. Ind. Mus. ii, p. 56, ♀ (1908); i, pl. xi, fig. 2, full ins. (1907).

♂ ♀. *Head*: eyes pubescent, vertical triangle black; frons in ♂ with a blackish-brown transverse stripe from eye to eye, drawn through the lunule above base of antennæ; frons, and surface for a short distance below it, with rather long black pubescence; face prominent, bright yellow, shining, slightly dusted, with long yellow pubescence, especially at sides, where some blackish hairs are intermixed; lower part of head and mouth-border black. Antennæ and arista black, 3rd joint elliptical, 2½ times as long as deep. Occiput black, posterior orbit of eyes with yellow pubescence. In ♀, face with very short yellow pubescence; frons blackish with blackish hairs, slightly wider below, and a pale irregularly shaped yellow spot immediately above base of antennæ. *Thorax* black or blackish with yellow and black hairs intermixed; pleuræ with long blackish pubescence in ♂, in ♀ dark brown with brownish-yellow hairs. Scutellum in ♂ brown with long black pubescence and shorter yellow hairs intermixed; in ♀ with yellow hairs. *Abdomen* in ♂ with 1st, 2nd and 3rd segments black, with black pubescence on 1st and 3rd and yellow on 2nd; rest of abdomen reddish-orange with pubescence varying from concolorous to yellow. In ♀, 2nd segment with traces of a translucent band somewhat as in *Leucozona lucorum**. The pubescence stands out densely for some distance at the sides of the abdomen. *Legs* in ♂ with greater part of femora and a ring in middle of tibiæ, which is widest on hind pair, blackish-brown; tibiæ and tarsi reddish-brown; femora and hind tibiæ on outer side with long hair; tibiæ and tarsi with comparatively shorter depressed golden-yellow pubescence; in ♀ legs tawny; basal half of all femora blackish. *Wings* pale grey, slightly clouded in ♂; a broad brown band across middle from costa to about base of discal cell; anterior cross-vein much before middle of discal cell; base of wing brown.

Length, 13–15 mm.

* A rather common European Syrphid.

Described by Kertesz from a single rather damaged ♂ from Sikkim, presumably in the Hungarian Museum; my *ruficauda* was described from three ♀ ♀ in the Indian Museum from the same locality. The two descriptions are united herewith as they represent only one sex each and shew slight differences.

82. **Eriozona himalayensis**, *Brun.*

Eriozona himalayensis, Brunetti, Rec. Ind. Mus. xi, p. 217 (1915).

♂. *Head* wholly moderately shining black; frons with a pale yellowish-grey tomentum when viewed in certain lights; face with more obvious similarly coloured tomentum or minute pubescence, a median rather broad space being bare; some longer black hairs on the cheeks. Proboscis black. Eyes with thick dark brown pubescence; eye-margins as in *Chilosia*. Antennæ black, 3rd joint dull, no longer than deep, arista black. Occiput blackish-grey with yellow hairs round the margins, with which are intermixed some black hairs behind the vertex. *Thorax* moderately shining black, with, in certain lights, a slight æneous tinge; prothorax dull æneous, covered with light brownish-yellow, rather thick pubescence, rest of dorsum covered with black pubescence; scutellum with long thick black pubescence, lower posterior margin with a fringe of short yellowish hairs. Mesopleura and sternopleura with thick yellowish pubescence, rest of sides of thorax with sparser black hairs. *Abdomen* shining black, 3rd and 4th segments dull æneous, all covered thickly with bright orange-red pubescence, which becomes more yellowish on 1st segment and on sides of 2nd. Margins of 3rd and 4th segments, and whole of venter, with black pubescence. Genitalia dark grey with black hairs. *Legs* black, with short black pubescence, which is rather long on under side of femora, the hind pair having in addition two diverging rows of long, widely separated hairs. *Wings* grey, anterior margin slightly darker; a broad brownish infuscation from round the stigmatic region across the middle of the wing extending half-way to the posterior margin. Halteres yellow, clubs black.

Length, 13–14 mm.

Described from several ♂ ♂ from the Kumaon District, Western Himalayas, 20. vi. 1914 to 20. vii. 1914; Onari, Garhwal District, 11,000 ft. (*Tytler*).

This species evidently mimics the bee, *Bombus hæmorrhoidalis*, Smith.

Genus **ASCIA**, *Meig.*

Ascia, Meigen, Syst. Beschr. iii. p. 185 (1822).
Neoascia, Williston, Bull. U.S. Nat. Mus. No. 31, p. 111 (1886).

GENOTYPE, *Syrphus podagricus*, Fabr.; by designation of Westwood (1840).

Head distinctly broader than thorax, æneous; eyes bare, separated in both sexes, antennal prominence very slight; face

slightly hollowed below antennæ, produced, distinctly snout-like at upper mouth-edge, without any central bump; antennal 3rd joint elongate, rather porrect; arista short, bare, dorsal. *Thorax* quadrate, robust, nearly bare, scutellum similar. *Abdomen* at least twice as long as thorax, much narrowed at base about the junction of 1st and 2nd segments, behind that club-shaped, arched, tip narrowly rounded; 1st segment long, 2nd longer than 1st, 3rd longer than 1st but shorter than 4th, which is itself shorter than 2nd; a peculiar pointed projection from basal corners of abdomen. *Legs* simple; hind femora much thickened, spinose below, hind tibiæ slightly curved. *Wings* with apical sections of 4th and 5th veins very upright; anterior cross-vein much before middle of discal cell.

Range. Europe, Canary Islands, Orient, North America.

Life-history. Lundbeck thinks that the larvæ probably live on micro-organisms rather than aphids; he figures them and a pupa (Diptera Danica, v, p. 375 (1916)).

83. **Ascia brachystoma**, *Wied.*

Ascia brachystoma, Wied., Auss. Zweifl. ii, p. 90, ♀ (1830).

♀. *Head* black, white-haired; antennæ blackish-brown, reddish-yellow below; 1st and 2nd joints horizontal, 3rd drooping, oval, tip rounded; proboscis dirty yellow; epistome hardly convex, perpendicular; upper mouth-border not produced. *Thorax* black, with white pubescence. *Abdomen* club-shaped; 2nd segment, hind border of 3rd, and remainder yellowish-brown; emarginations of segments, sides of abdomen towards base, and tip of 4th segment, with white hairs. *Legs* dirty yellow; femora brown; hind tibiæ towards tip blackish-brown. *Wings* quite clear, venation as in the European *A. podagrica.*

Length, about 4 to 5 mm.

East India: in Berlin, Copenhagen and Wiedemann collections.

Walker states that this species has been recorded from Hindustan, but gives no actual data. Macquart, also without definite data, quotes it as having occurred in "Indes Orientales," which may mean the East India Islands. Wiedemann describes it from "Ostindien," which, I believe, was with writers of that period a general term for the whole of the Orient.

Genus **SPHEGINA**, *Meig.*

Sphegina, Meigen, Syst. Beschr. iii, p. 193 (1822).
Sphægina, Rondani, Dipt. Ital. Prod. ii, p. 102 (1857).

GENOTYPE, *Musca clunipes*, Fallén (Europe); by original designation.

Head semicircular, rather wider than thorax; eyes bare, distinctly separated in both sexes; face deeply concave below

antennæ, with no central knob, but with upper mouth-edge much enlarged; antennæ short, 3rd joint ovate, the dorsal arista slightly pubescent. *Thorax* subquadrate, corners rounded, pubescence very short; scutellum normal, practically bare, a pair of subapical marginal bristles. *Abdomen* much narrowed at base, about twice as long as thorax, more or less club-shaped. *Legs* slender; hind femora very much thickened and very spinose below; hind tibiæ curved; basal joint of hind tarsi dilated. *Wings* with normal venation, except that the apical portions of the 4th and 5th veins are turned sharply upwards and are upright and somewhat rectangular at the bend; anterior cross-vein before middle of discal cell; alulæ very small; squamæ small, with characteristic fringes peculiar to this genus.

Range. Europe, Orient, North and South America, Brazil.

Table of Species.

1.	Wings with small brownish infuscations	2.
	Wings entirely clear . .	3.
2.	Thorax wholly black; anterior cross-vein just before middle of discal cell; hind femora all black except at base .	*bispinosa*, Brun., p. 107
	Thorax brownish; anterior cross-vein almost exactly at one-third of discal cell, not beyond this point; hind femora with distinct pale transverse streak below	*tristriata*, Brun., p. 108.
3.	Length 4–4½ mm.; abdomen mainly black	4.
	Length 7 mm.; abdomen wholly reddish-brown	*tricoloripes*, Brun., p. 109.
4.	Hind femora yellow; a black ring at middle and tip	*asciiformis*, Brun., p. 110.
	Hind femora yellow on basal half; apical half black	*tenuis*, Brun., p. 111.

84. **Sphegina bispinosa**, *Brun.* (Pl. III, figs. 9, 10.)

Spheyina bispinosa, Brunetti, Rec. Ind. Mus. xi, p. 223 (1915).

Near *S. clunipes*, Fall., of Europe. ♂ ♀. *Head*: frons and face with practically parallel sides, only the latter a little broader on lowest part; frons at vertex in ♂ a little more than one-fifth of the head, shining black, bare, but from a low angle in front a little greyish dust can be seen on both frons and face. Antennæ with first two joints black, 3rd and arista dark brown, latter microscopically plumose. Lower part of head and proboscis black, latter brown towards tip. Occiput black, concave, shining, a little grey-dusted in centre, dead-black behind vertex, no part extending beyond eye-margin. In ♀, frons more than one-fourth of the head; antennæ a little paler. *Thorax* blackish, a little shining and with a more or less dark blue tinge and microscopic, depressed pale hairs; suture exactly at middle of dorsum, very distinct towards sides. Pleura blackish, practically bare, a suspicion of grey dust here and there; scutellum concolorous, some

microscopic pale hairs towards hind margin. *Abdomen* concolorous, with a bluish tinge; 2nd segment twice as wide as 3rd, barely wider at tip. In ♂, with a short tooth-like process on each side of 1st segment, just behind the halter, and three prominent black bristles, the front one the smallest. Pubescence of abdomen whitish, sparse, short and uniform, longer at sides, longest on sides of 2nd segment and on dorsum of last segment in ♀. Venter dark, with sparse pale pubescence; under side of last segment of abdomen in ♂ with about seven long, strong, socketed, black bristles on hind margin, slightly curved upwards as though to protect the genitalia; the latter large, black, shining, twisted to the left, with long, pale, stiff and soft hairs. *Legs*: front pair dirty brownish-yellow; femora and tibiæ darker, except at base and tip; middle legs similar, but with a greater extent of black. Hind legs shining black with a bluish tinge, femora and tibiæ both narrowly orange at base; also with a narrow ring on latter at or just beyond middle, the ring broader in the ♀; tarsi black, with dense rich orange-brown pubescence below. Pubescence of legs microscopic or absent; two or three long isolated hairs on upper side of hind femora near tip, and a row of rather small spines below. In ♀, anterior legs all yellowish except tips of tarsi, which are darker. *Wings* yellowish-grey, very iridescent; stigmatic region, anterior cross-vein, base of discal cell, tips of 2nd and 3rd veins and outer side of 1st posterior cell, narrowly brown-infuscated; anterior cross-vein just before middle of discal cell. Halteres very pale yellow.

Length, 7½ mm.

Described mainly from a (*type*) ♂ from Sureil, Darjiling District, 5000 ft., 11–31. x. 1917 (*Annandale* and *Gravely*), and from the *type* ♀ in the Pusa collection from Mussoorie, ix. 1906.

Type ♂ in Indian Museum in indifferent condition.

The species is remarkably like the European *S. clunipes*, Fall., but quite distinct, as in the latter the tooth and bristles at the base of the abdomen are absent and the wings are quite clear. There are also one or two other minor differences.

85. Sphegina tristriata, *Brun.*

Sphegina tristriata, Brunetti, Rec. Ind. Mus. viii, p. 165, pl. vi, fig. 7, wing (1913).

♀. *Head*: frons uniformly wide, about one-fourth of the head, shining black, but not brilliant. Eyes dull red, antennæ brownish-yellow, 1st joint brownish, 3rd a little infuscated above at the tip. Mouth-parts and proboscis yellowish. *Thorax*: ground-colour brownish-yellow, but dorsum almost wholly occupied by three practically contiguous dark brown stripes, with only a brief space between them (at their middles) as they are united on the anterior margin and practically so near the posterior margin also; pleuræ dark brown; scutellum concolorous. *Abdomen* mainly

black, base of 2nd segment and whole of 3rd pale whitish-yellow. *Legs*: anterior pairs pale yellow, tips of tarsi brownish; hind legs yellowish-brown, with femora broadly dark brown at tips and on upper side, the colour extending over the sides, but not reaching the ventral surface for a certain space beyond the wholly pale yellow base. *Wings* pale grey, subcostal cell darker grey; tip of wing infuscated as far inwards as just proximal to the upturned section of 4th longitudinal vein; but, in the marginal cell,

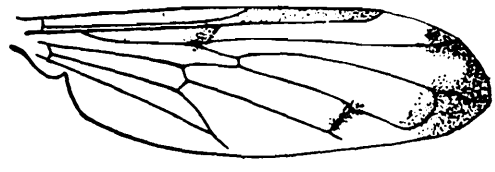

Fig. 19.—*Sphegina tristriata*, Brun., wing.

implanted in the infuscated part, is a tear-shaped clear spot in contact with the clear part of the wing; small infuscations over the origin of 3rd vein, anterior cross-vein and upturned section of 5th vein; anterior cross-vein almost exactly at one-third of discal cell, not beyond one-third. Halteres dirty white.

Length, 6 mm.

Described from a unique ♂ from Rotung, N.E. Frontier of India, 6–13. iii. 1912 (*Kemp*). In the Indian Museum.

86. **Sphegina tricoloripes**, *Brun.* (Pl. III, fig. 11.)

Sphegina tricoloripes, Brunetti, Rec. Ind. Mus. xi, p. 225, pl. xiii, fig. 9, wing (1915).

♀. *Head*: frons blackish-grey, nearly one-third the width of the head, uniform in width, vertical triangle not very distinct; face blackish-grey; upper mouth-border well produced, proboscis moderately long, brownish-yellow. Antennal prominence distinct but small, antennæ blackish; 3rd joint slightly produced above at base; occiput blackish-grey. *Thorax* dull blackish, with two rather narrow, well separated, greyish dorsal stripes from anterior margin to scutellum; shoulders a little greyish. Scutellum rather shining black, with a pair of apical pale bristles, convergent and weak. *Abdomen* tawny-brown, much contracted at base, widening rapidly from middle of 2nd segment to tip of 3rd, thence gradually narrowing; upper side of last segment a little obscure; a few long whitish hairs at sides at base of abdomen, the remainder of the dorsal and ventral surfaces practically bare. Venter tawny-brown. *Legs*: front pair with coxæ, base and tip of femora, basal half of tibiæ and the metatarsi yellow, the remainder black. Middle pair similar, but the very short coxæ obscure. Hind pair much enlarged, with obscure coxæ; of the hind femora the basal fourth is bright lemon-yellow, the remaining portion with

proximal half black and distal half reddish-brown; extreme tip black. Under side beset with several rows of very short spines, and an additional row of about 8 or 9 longer ones. Tibiæ distinctly but not greatly curved, pale yellow, rather less than the apical half black; tarsi all black, metatarsi distinctly enlarged and lengthened. *Wings* pale grey; subcostal cell yellowish from tip of auxiliary vein; 4th longitudinal vein curved upwards to 3rd in a very rounded loop; 5th vein bent upwards at a slightly obtuse angle; halteres yellow.

Length, 7 mm.

Described from a single ♀ in the Indian Museum presented by Dr. A. D. Imms, taken by him at Bhowali, Kumaon District, 5700 ft., 2. vii. 1910. A second ♀ was taken by Col. Nurse, Simla, viii. 1898; in company with yet another ♀, probably conspecific, but with the abdomen all black except the basal half of the 3rd segment, which is yellowish, and the apical two-thirds of the hind femora, which are all black.

87 **Sphegina asciiformis**, *Brun.*

Sphegina asciiformis, Brunetti, Rec. Ind. Mus. xi, p. 223 (1915).

♀ *Head*: frons æneous-black, with a little yellowish-grey tomentose dust along the eye-margins. Antennæ with 1st and 2nd joints dark brown, 3rd joint black with long dorsal arista placed at the base of the joint. Mouth-parts reddish-brown. Occiput dark grey. *Thorax* dusted with yellowish-grey, a little lighter on the shoulders; three moderately wide dorsal infuscated stripes, separated from each other by less than their own width. Scutellum shining black, with a little hoary dust. Sides of thorax blackish, with a little greyish dust on upper parts. *Abdomen*: the 1st segment narrow, 2nd very much contracted at base, thence suddenly widened; rich shining deep mahogany-brown, nearly black, with very sparse and almost microscopic whitish hairs. Venter yellow-ochre; two small black spots in a dorsal line near the base, and a median well marked black line on the apical half. *Legs*: anterior four bright yellow. Hind femora much incrassated, yellow, a blackish band in the middle (incomplete below), and a complete broad black ring at the tip. Under side with two rows of minute black spines; hind tibiæ pale yellow, a long black streak below at base, and a blackish ring (incomplete on upper side) at tip. Hind tarsi brown, their metatarsi distinctly thicker than the tibiæ, nearly half as long and about as wide as rest of tarsi. *Wings* absolutely clear, brilliantly iridescent; halteres blackish.

Length, 4 mm.

Described from a unique ♀ taken by me, 29. v. 1910, at Darjiling. In the Indian Museum.

From the small size and very contracted base of the abdomen, this species closely resembles an *Ascia*.

88. **Sphegina tenuis**, *Brun.*

Sphegina tenuis, Brunetti, Rec. Ind. Mus. xi, p. 224 (1915).

♂ *Head*: frons dull black, with grey dust, ocelli distinct, red; the concavity in profile below the antennæ well marked. Antennæ black, a little dull grey-dusted, arista very curved; mouth-parts reddish-brown. Occiput grey. *Thorax* black, with yellowish-grey dust and three dorsal infuscated stripes, the median one the widest, the outer ones slightly interrupted at the suture and not reaching the shoulders. A pale grey spot on the latter can be seen if viewed from behind. Sides of thorax blackish, with yellowish-grey hair. *Abdomen* black, 2nd segment much attenuated and very long, 3rd with a broad yellowish sub-basal band. Genital organs large, apparently globular. Venter black, greater part of 3rd segment brownish-yellow. *Legs*: the first two pairs pale yellow with the last two tarsal joints black. Hind coxæ black, hind femora considerably incrassate; basal half pale yellow, apical half black; hind tibiæ mainly dark brown, pale at tips, and a narrow band just beyond the middle (which band appears as if in some examples it might be interrupted); hind tarsi blackish-brown, the hind metatarsi thickened, but only one-third as long as the tibiæ. *Wings* yellowish-grey, brilliantly iridescent; stigma long, brown; halteres brownish-yellow.

Length, 4½ mm.

Described from one ♂ from Darjiling, taken by me, 29. v. 1910, and incorrectly recorded as a ♀. In the Indian Museum.

Genus **SPHEGINOBACCHA**, *de Meij.*

Spheginobaccha, de Meijere, Tijd. v. Ent. li, p. 327 (1908).

GENOTYPE, *Sphegina macropoda*, Big.; by original designation.

Body narrow. Basal half of abdomen rather contracted; 2nd segment the longest, 3rd and 4th rather shorter, subequal. Eyes in ♂ narrowly separated, in ♀ parallel on hinder half, wider apart in front. Epistome with small central bump, not produced over mouth. Antennæ moderately long; 3rd joint rather large, rather longer than broad, rounded; arista bare. Eyes sparsely pubescent. Humeri comparatively large. Hind femora not thickened, spinose below on apical half. On middle of outer side of 1st posterior cell is the stump of a vein projecting inwards; a similar stump projects from the lower side of the cell, near the tip of the discal cell; 4th vein with a short appendix at its flexure upward; outer side of discal cell straight; anterior cross-vein much before middle of discal cell; 3rd vein nearly straight; alulæ well developed.

This genus is allied to *Ascia* and *Sphegina* in possessing spinose hind femora, but is distinguished from them by the well-developed alulæ, the course of the anterior cross-vein and of the veins at

the wing-tip. It is distinguished from *Syritta* by the non-thickened hind femora; from *Baccha* and allied genera by the hind femora being spinose, and by possessing the stumps of veins near the wing-tip and the separated eyes in the ♂. The following is the only species.

89. Spheginobaccha macropoda, *Big.*

Sphegina macropoda, Bigot, Ann. Soc. Ent. France, (6) iii, p. 331 (1883).

Spheginobaccha macropoda, de Meijere, Tijd. v. Ent. li, p. 327, ♂ ♀, notes (1908).

♂ ♀. *Head*: frons in ♂ shining blue-black with black hair, in ♀ shining blue-black, with a white dust-spot in the middle on each side touching the eye-margins; frons with a deep transverse furrow; eyes with a little pale pubescence; epistome not produced, but with a median tubercle at about middle of face; the latter black with a little white tomentum at sides. Antennæ tawny, 3rd joint rather large, broadly oval, tip obtuse; arista bare, blackish-brown. *Thorax* black, slightly shining; humeral calli prominent, tawny; a lateral straight line above the wings and a transverse band on the pleuræ, tawny; scutellum pale tawny. *Abdomen* moderately shining black; segments finely bordered with tawny; 2nd and 3rd segments with a wide squarish tawny spot, rounded on inner sides, on each side; 4th with a pair of broad spots leaving only a narrow median space, or united to form a broad oblique band, the spots visible through the white dust on the segment. *Legs*: hind femora elongate, a little incrassate, not clavate, with small spines below; hind metatarsi relatively thick and elongate. Legs in ♂ yellow; tips of fore and middle femora, apical half of hind femora, and all tibiæ and tarsi, black; in ♀, tips of fore femora a little brownish *. *Wings* with 2nd and 3rd veins gently curved; 1st posterior cell closed a little before wing-tip; outer side of this cell curved inwards, with a stump of a vein at its greatest convexity, another at the flexure of the 4th vein and a third on the lower side of the cell towards the end; anterior cross-vein much before middle of discal cell; latter with lower outer angle somewhat rounded; costal cell and whole of wing-tip rather narrowly, brownish; stigma brown.

Length, 11 mm.

The above description is compiled from those of Bigot and de Meijere. *Type* in Bigot collection, from Burma; de Meijere's specimen is from Semarang, Java, October (*Jacobson*).

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* Description of legs by de Meijere. Bigot writes, "Femora tawny, tibiæ whitish, broadly black at tips, tarsi black."

Genus **BACCHA**, *Fabr.*

Baccha, Fabricius, Syst. Antl. p. 199 (1805).
Bacca, Rondani, Dipt. Ital. Prod. ii, p. 104 (1857).
Bacha, Schiner, Faun. Austr. i, p. 323 (1862).
Bacchina, Williston, Mon. N. Amer. Dipt. 2nd Ed. p. 86 (1896).

GENOTYPE, *Syrphus elongatus*, Fabr.; by designation of Curtis, Brit. Ent. (1839).

Head more than hemispherical, broader than thorax, flattened behind; frons slightly prominent; eyes bare, contiguous for a long distance in ♂, narrowly separated in ♀; antennæ short, 3rd joint deeper than long, arista bare. Face generally swollen in centre, the swelling forming an indefinite bump, or with a small distinct tubercle. *Thorax* and scutellum normal, former much wider across the middle. *Abdomen* very slender, very much longer than thorax, 2nd and 3rd segments very long and narrow, behind which the abdomen widens gradually nearly to tip. Some pubescence at sides of abdomen on basal half. *Legs* long, thin,

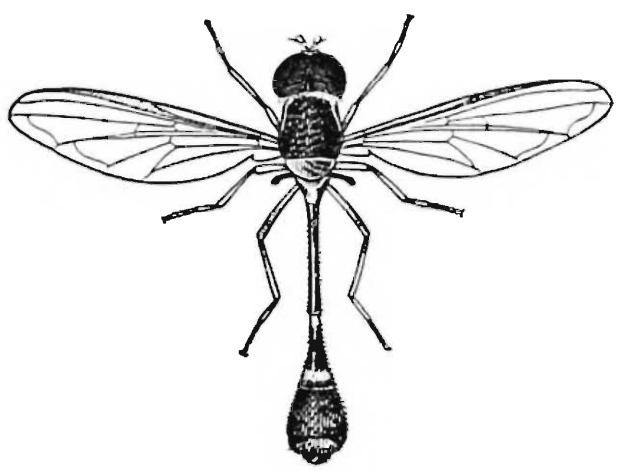

Fig. 20.—*Baccha triangulifera*, Aust. (*elegans*, Brun.), ♂.

simple; hind femora distinctly lengthened but not thickened; basal joint of hind tarsi generally thickened. *Wings* with venation of *Syrphus*; alula very small or almost absent; squamæ small, inconspicuous; wings at rest folded over abdomen.

Very slender, graceful flies of moderate size, fond of hovering; the species somewhat difficult to separate.

Life-history. Larvæ feeding on *Aphidæ*, or perhaps *Coccidæ*.

Range. Practically world-wide.

The exact generic limits of *Baccha* are not very definite. Some authors include in it *Ocyptamus*, a North American group, whilst Major Austen seems to have much extended the scope of the genus. The 2nd segment of the abdomen is sometimes almost fused with the broader, very short 1st segment, and this must not be lost sight of in interpreting the descriptions.

Table of Species *.

1. Wings with a conspicuous transverse dark band across middle	*dispar*, Walk., p. 115.
Wings never so marked	2.
2. Wings mainly or to a considerable extent brown; in *nubilipennis* mainly dark brown; in *fallax* almost wholly pale brown; in *nigricosta* and *umbrosa* with a large median diffused brown spot on a comparatively or actually clear background ...	3.
Wings never to any extent brown. Ground-colour clear, or nearly so, with at most anterior margin and a small apical spot dark, or (in *maculata*) a few very small dark spots on disc	4.
3. (*a*) Wings practically wholly dark brown, but just appreciably paler at base and tip	*nubilipennis*, Aust., p. 116.
(*b*) Wings wholly pale brown except basally nearly clear	*fallax*, Aust., p. 117.
(*c*) Apical wing-spot practically united narrowly to costal dark band; abdominal markings dull orange .	*nigricosta*, Brun., p. 118.
(*d*) Apical wing-spot separated from end of costal dark band by a wide clear space; abdominal markings bluish-grey	*umbrosa*, sp. n., p. 119.
4. Anterior cross-vein suffused, and a narrow brown streak from end of præfurca nearly to anal cell.	*maculata*, Walk., p. 119.
Disc of wing always clear.	5.
5. Abdomen barely narrower at base than at widest part	6.
Abdomen very distinctly contracted at base	7.
6. Antennæ yellowish or orange	*robusta*, Brun., p. 120.
Antennæ wholly black	*plumbicincta*, Brun., p. 121.
7. No yellow pleural or presutural spots; no yellow markings on body.	*sapphirina*, Wied., p. 122.
At least mesopleura with a vertical callus-like spot	8.
8. (*a*) Side-spots of thorax consisting of a vertical spot on mesopleura, and a small round presutural spot buried in ends of suture; sternopleural spot absent, but individuals might shew a trace of paleness there	*pulchrifrons*, Aust., p. 122.

* For notes on, and a table of a number of, Oriental species, *v.* de Meij., Tijd. v. Ent. li, p. 316 (1908).

(*b*) Side-spots distinct, three, elongate, presutural, mesopleural and sternopleural. Abdomen mainly reddish-brown, with a large yellow spot at or towards tip of 3rd segment... *triangulifera*, Aust., p. 124.

(*c*) Side-spots as in *triangulifera*. Abdomen mainly yellow with black bands across 3rd and 4th segments *amphithoe*, Walk., p. 126.

90. **Baccha dispar**, *Walk.*

Baccha dispar, Walker, Proc. Linn. Soc. Lond. iv, p. 121 (1860).

♂ ♀ *Head*: eyes dark red-brown, in ♂ closely contiguous, the very small black vertex barely raised, bearing a few black-brown stiff hairs; in ♀ comparatively well separated; frons in ♂ fairly prominent, shining black, with an æneous tinge and black-brown hairs, rapidly widening in ♀ to $2\frac{1}{2}$ times as wide at level of antennæ, with yellowish-grey dust except on the shining black vertex; face slightly narrower in ♂ and ♀ in lower than in upper part, yellow with a broad blackish median stripe and whitish pubescence; mouth-border and proboscis brown. Region round base of antennæ shining black; antennæ bright orange. Occiput dark, with fringe of pale yellow hairs. *Thorax* black, with brownish-yellow pubescence; humeri brownish-yellow; a conspicuous yellowish presutural callus-like spot in ♂, which in ♀ extends nearly to the humerus; a similar vertical spot on mesopleura, bearing whitish pubescence; sternopleura with upper part æneous in ♂, in ♀ bearing a callus-like horizontal spot, all the spots in ♀ more orange. Pleuræ a little æneous in front in ♂, lower part of sternopleuræ grey-dusted in ♂ ♀; inconspicuous whitish pubescence on pleuræ generally. *Abdomen*: in ♂, 1st segment dull brownish-yellow, remainder shining black; 3rd segment with a pair of narrow, linear, diagonally placed yellowish spots across middle of surface, their inner ends well separated; 4th segment with a pair of rather large yellowish spots on anterior margin, their inner sides well separated and parallel, their outer sides arcuate, the convexity outwards, their hinder sides deeply excised, the whole spot roughly in the shape of a finger and thumb. In ♀ with 1st and 2nd segments and basal half of 3rd shining brown; rest of abdomen black; a broad yellowish transverse band occupying middle third of 3rd segment, and a similar band on base of 4th, bent hindwards at each end, not reaching side margins. Pubescence in ♂ and ♀ sparse, whitish. Venter yellowish, some darker transverse bands corresponding to the darker parts on upper side. *Legs*: fore legs yellowish-orange; hind coxæ black, rest of legs generally rather darker; apical half of hind femora and hind tibiæ (in ♀) and the metatarsi (in ♀) dark brown. *Wings* clear; a moderately dark brown narrow band on costa extending to tip of 3rd vein; a transverse band from costa, nearly reaching hind margin, ending over tip of anal cell, in breadth

extending from base of 3rd vein to anterior cross-vein. Halteres dirty brown.

Length, 12 mm.

Redescribed from the *type* ♂, in fair condition, in the British Museum, from Celebes; and from one ♀ in the Indian Museum named by Bigot and undoubtedly of this species. There is a further specimen from the Nilgiris, in wretched condition, 3000 ft., 13. ix. 1917 (*Nagnath*).

Walker's description of the ♀ abdomen, "2nd yellow band not arched," does not quite apply, but the cross-band on the wings is sufficient to separate the species from all others.

91. Baccha nubilipennis, *Aust.*

Baccha nubilipennis, Austen, Proc. Zool. Soc. Lond. p. 136, pl. iv, figs. 7 (full ins. col., ♂), 9 (full ins. col., ♀); pl. v, fig. 14 (head, ♂, profile) (1893).

♂ ♀ *Head*: "Face and cheeks yellow, with yellow pollen and pale yellow pile. Cheeks in ♂ sometimes narrowly blackish immediately below the eyes. A prominent, rounded and sharply defined facial tubercle, commencing half-way down the face; sometimes an indistinct brown stripe between it and the antennæ. Antennæ orange, 3rd joint large, ovate, larger in ♀ than in the ♂. A very pronounced antenniferous process, shining black above, and orange-yellow immediately above the base of the antennæ; the orange-yellow area is larger in the ♀; the projection is truncate and flattened in front and pilose on the sides only. Front in ♂ greenish-black with yellow pollen and vertical triangle black; in ♀ shining black with a narrow triangular area on each side, in front yellow pollinose. Pile on front blackish in ♂, yellowish in ♀, shorter in the latter than in the former. Occiput with a fringe of pale yellow hairs. *Thorax* shining black; the collar of hair in front pale yellow; elsewhere nearly bare. Humeri and postalar callosities brownish; pleuræ with a broad vertical stripe of golden pollen in front of the suture; the stripe has a reddish ground; pleuræ behind wings silvery-pollinose. Scutellum polished dark brown on the disc, more or less yellowish, semi-translucent behind. General colour of the *abdomen* metallic black (browner in ♀), sometimes with a distinct bluish sheen; the abdomen is broadest in the 4th segment. The 1st segment has outstanding pale yellow hairs on each side; elsewhere the abdomen is clothed with very short appressed black pile. 1st segment black, browner and with an edging of yellow in the ♀; 2nd segment with a basal yellow band, notched in the median line behind, and with an interrupted brownish-yellow band near the tip, the latter often scarcely visible in the ♂; 3rd segment with a conspicuous transverse yellow band, occupying about the middle third of the segment but slightly nearer the base; the remaining segments wholly metallic black; male genitalia small and concealed. *Legs* orange-yellow; posterior femora slightly darker, dark brown

above and below on the distal half but orange at the tips; posterior tibiæ reddish on basal third, then dark brown; posterior tarsi dark brown on basal two-thirds of 1st joint, then whitish-yellow. *Wings* infuscated, dark brown in the middle, and usually darker in the ♂ than in the ♀; in the ♀ the wings show a faint secondary infuscation at the tips, above the third vein; an area at the base on the inner side nearly hyaline; 3rd vein gently curved above the base of the 1st posterior cell; in the ♂ the wings are narrower and less rounded at the tips, while the terminal section of the 4th posterior vein, closing the 1st posterior cell, is less sinuate and more oblique than in the ♀; alulæ long, narrow, posterior margin straight.

"*Length*, ♂ $12\frac{1}{2}$–$14\frac{1}{2}$; ♀ $12\frac{3}{4}$–$13\frac{2}{3}$ millim. Ceylon."

Kandy, 1800 ft., 28. vi. 1892, type ♂; 25. v. 1892, type ♀. Common in Central Province of Ceylon; 1 example from Baddegama, near Galle; Nilgiri Hills, 2500 ft. (*H. L. Andrewes*); Trivandrum, Travancore; Pollibetta, Ceylon, 24. x.–16. xi. 1915 (*Fletcher*): Cherrapunji, Assam (*Kemp*); above Tura, Assam, 3500–3900 ft., 15. vii.–30. viii. 1917 (*Kemp*); Shillong, 5000 ft., vi–vii. 1918 (*Fletcher*). Differing from all other Oriental species known to Austen by the abdominal markings and the sharply defined facial and antenniferous tubercles when viewed in profile.

Types in British Museum, also specimens from Kandy, 1700 ft., 25–30. v. 1892 (*Yerbury*); v. 1907 (*Green*); Pundaloya, Ceylon (*Green*).

92. **Baccha fallax**, *Aust.*

Baccha fallax, Austen, Proc. Zool. Soc. Lond. p. 142, pl. iv, fig. 12, full ins. col., ♂ (1893).

♂ "Very closely resembling *B. pulchrifrons*, differing as follows: front and broad median facial stripe reaching to the oral margin, metallic black, not steely; sides of the face, including upper portion, and cheeks deep yellow; antenniferous process considerably smaller, when viewed from above, and no trace of metallic violet spot on the side; thorax and scutellum more bronzed; pleural stripe orange, much more conspicuous, and rising higher on the sides of the dorsum; 1st segment of the abdomen pure yellow; 2nd segment considerably narrower and wholly bronze-black except the basal angles, which are yellow; the yellow markings on the 3rd and 4th segments entirely resembling those on the corresponding segments in the ♀ of *B. pulchifrons*, and not as in the ♂ of that species; wings longer and narrower; except at the base, uniformly suffused with brown, not darker in the middle; apical spot above the 3rd vein reduced to a mere line, so as to appear as a simple continuation of the stigma; alulæ long and rather narrow, with a straight posterior edge.

"Owing to the deceptive similarity between the markings on the abdomen of this species and those on the abdomen of

B. pulchifrons ♀, these specimens would certainly be regarded as males of the latter if regard were not paid to the differences enumerated above."

Galle, Ceylon, 27 iv. 1892, type ♂; Kandy, 30. v. 1892 (both *Col. Yerbury*). *Type* and second specimen in British Museum.

93. Baccha nigricosta, *Brun.*

Baccha nigricosta, Brunetti, Rec. Ind. Mus. ii, p. 50 (1908); i, pl. xi, fig. 5, wing (1907).

♂ *Head* with front above and below antennæ grey-dusted; eyes quite contiguous nearly to the vertex, which is very small and shining black; below antennæ a wide shining black stripe; frontal triangle above antennæ shining black seen from the front. Antennæ reddish-brown, the two basal joints black. Proboscis black, tip red. *Thorax* shining black, minutely pubescent, unmarked, sides blackish-grey; scutellum rather large, shining black, with a few pale hairs. *Abdomen*: 1st segment broadly semicircular, of exactly the same shape and size as scutellum, 2nd very pedicillate, 3rd narrow at base, thence sharply widening; general colour of abdomen black, moderately shining, with rather long blackish-grey hairs at sides of 2nd and 3rd segments, a pair of

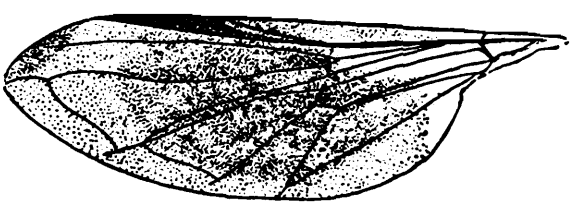

Fig. 21.—*Baccha nigricosta*, Brun., wing.

small transverse spots at middle of sides of 3rd segment, and a pair of sub-lunate ones lying across front corners of 4th segment, all orange and rather indistinct. *Legs* pale tawny, hind femora and tibiæ with a dark band towards the tip, hind tarsi blackish. *Wings* pale blackish; nearly clear at base; stigma black, much elongated; a blackish cloud immediately below it, and a small blackish spot at extreme tip of costa.

Length, barely 10 mm.

Described from one ♂ taken by Dr. Annandale (19–22. ix. 1906) at Bhim Tal, Kumaon; in the Indian Museum collection. A second specimen from Pusa, 16. xii. 1915.

The species can hardly be confused with any other, the conspicuous blackish cloud in the middle of the wing differentiating it from all the clear-winged species except *umbrosa*, and also sufficiently from the two species classed by me as wholly brown-winged.

94. Baccha umbrosa, sp. nov.

♂. Very near *nigricosta*, Brun., differing by the wings having the ground-colour grey, but possessing a similar brownish cloud over the middle of the costa, filling the middle third of the wing, dispersing gradually hindwards. Apical spot as in *nigricosta*, but quite detached from the large median cloud. *Abdomen* mainly blackish; 1st segment shining deep blue, 2nd æneous, 3rd æneous on basal half, 4th broadly blue-greyish at base and less distinctly so at tip, 5th and 6th almost wholly similarly coloured; pubescence of abdomen wholly whitish, short. Rest as in *nigricosta*, slightly smaller.

One ♂, Abu, Rajputana (*Nurse*).

Type presented by Colonel Nurse to the British Museum. A ♂ in the British Museum from Trincomalee, Ceylon, 23. i. 1891 (*Yerbury*), may be this species; it differs only in the 4th and 5th segments being much brighter shining blue. It is very slightly larger and in indifferent condition.

95. Baccha maculata, *Walk.*

Baccha maculata, Walker, Ins. Saund., Dipt. iii, p. 223 (1852).
Baccha tinctipennis, Brunetti, Rec. Ind. Mus. ii, p. 51 (1908); i, pl. xi, fig. 6, wing (1907).

♂ ♀ *Head*: frons in ♂ shining black with a steely bluish or æneous tinge and grey dust towards sides; face shining black with distinct small central bump, grey or yellowish-grey dust towards sides. Antennæ orange; antennal prominence shining black in ♂, blue-black in ♀. In ♀, frons shining blue-black with greyish dust at sides, face blue-black. Mouth-border and proboscis yellowish in ♂ ♀ *Thorax* shining black (more cupreous in ♂ and more bluish in ♀) with very short grey pubescence; humeri, a short longitudinal stripe on mesopleuræ in front of wing-base,

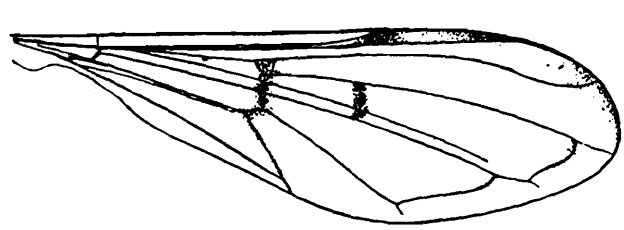

Fig. 22.—*Baccha maculata*, Walk., wing.

and the dorsal margin between them, cupreous in ♂, yellowish in ♀ Scutellum shining black (♂) or blue-black (♀). *Abdomen* shining brown; 1st segment normally all yellowish; tip of 2nd, base of 3rd narrowly and of 4th more broadly, yellowish; sometimes a pair of small pale spots at base of 5th segment, the pale markings very inconstant. In ♀, the pale colour more extensive, even to the extent of the 4th and 5th segments being wholly

orange-brown. *Legs* yellowish, a subapical brownish ring on hind femora and an ill-defined broad median dark band on hind tibiæ; hind tarsi darker. *Wings* clear, with a dark brown oblong stigma; tip of subcostal cell, tip of wing between tips of 2nd and 3rd veins or thereabouts, anterior cross-vein and a streak from bifurcation of 2nd and 3rd veins down to upper margin of anal cell, brownish. The wing-markings subject to individual variation.

Length, 8–12 mm.

Redescribed from various specimens of both sexes, in excellent condition, in the Indian Museum, and from other sources. Bhim Tal, 4500 ft., 22–27. ix. 1906, *type* ♀ of *tinctipennis* (*Annandale*); Simla Hills, 8000–9000 ft. (*Annandale*, *Kemp*); Lebong, 4500 ft., 2–9 & 26. vi. 1909 (*Howlett*); Mussoorie, x. 1906; Darjiling, 6900 ft. (*Brunetti*); 6000–7000 ft., 12. vi. 1914 (*Gravely*); Kurseong, 5000 ft. (*Annandale*); Siliguri; Shillong, 5500–6400 ft., 29. viii.–5. ix. 1915 (*Kemp*); 5000 ft., ix. 1917 (*Fletcher*); Cherrapunji, Assam, 4400 ft. (*Kemp*); above Tura, Garo Hills, 3500–3900 ft., 15. vii.–30. viii. 1917 (*Kemp*); ix. 1917 (*Mrs. Kemp*). Some specimens taken by me at Kobe, Japan, 15. v. 1906, may belong to this species.

Walker's *type* in the British Museum is labelled "East Indies," which is understood to mean East India and is in very indifferent condition, but the identity of my *tinctipennis* with this species is certain. He gave the length as 8 lines, but his type measures only 12 mm. My *tinctipennis* was described from a single ♀ in the Indian Museum, but numerous other specimens have come before me.

96. **Baccha robusta**, *Brun.*

Baccha robusta, Brunetti, Rec. Ind. Mus. ii, p. 50 (1908); i, pl. xi, figs. 3, abdomen, 4, head (1907).

♂. *Head*: frons above antennæ triangular, nearly wholly occupied by a shining black triangle; the remainder grey; vertex shining black; below antennæ, dull black when seen from below, but brilliant, shining, silvery-white when seen from above. Eyes subcontiguous at nearest point of approach, rather widely separated at vertex. Antennæ bright red, tip of 3rd joint brown above. *Thorax*: dorsum cinereous, with three darker stripes, of which only the centre one attains the fore border. Humeral calli testaceous; sides of thorax grey. Scutellum dull testaceous. *Abdomen* only slightly contracted at base; 2nd and 3rd segments pale tawny, posterior borders widely blackish, 4th segment wholly black, with an arched band of pale shining grey, interrupted in the middle, near base; extreme posterior border of segment brown. *Legs* black; four anterior femora, basal half of hind femora, and basal half of all the tibiæ, yellowish-tawny; tips of anterior femora sometimes darkened above. *Wings* clear; stigma yellow; halteres yellowish.

♀. Frons rather broad, grey, callosity above antennæ shining black, oblong, nearly reaching from eye to eye; upper part of frons shining black, reaching from the vertex nearly to the callosity. Abdomen black; 2nd segment with a vertically elongated

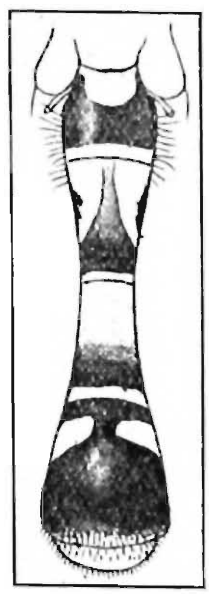

Fig. 23.—*Baccha robusta*, Brun., abdomen.

pale spot on each side, the spots nearly meeting in the centre on the fore border; 3rd and 4th with a transverse hoary yellowish-grey oval spot on each side, nearly on the fore border; 4th segment with brown posterior border; last segment brown.

Length, 10-12 mm.

Described from six ♂ ♂ and four ♀ ♀ in the Indian Museum collection, from Mergui, including *types* (*Doherty*). Darjiling, 1000–3000 ft. (*Lord Carmichael's coll.*); Tenasserim Valley; base of Dawna Hills (*Annandale*). It appears to be fairly widely distributed and by no means rare.

97. Baccha plumbicincta, *Brun.*

Baccha plumbicincta, Brunetti, Rec. Ind. Mus. xi, p. 222 (1915).

♀. *Head*: frons broad, distinctly but not greatly broader above antennal prominence, where it is nearly one-fourth the width of the head; bluish-black, the colour sharply demarcated behind vertex; a little whitish tomentum about the middle of inner orbit of eyes; face, down to a little above mouth-opening, bluish-black, slightly grey-dusted, with a central conspicuous black bump; remainder of lower part of head, including buccal region, uniformly bright yellow. Antennæ black, 3rd joint broad, arista black. Occiput grey. *Thorax*: dorsum and scutellum lead-colour, shining, with slight coloured reflections when viewed from different angles; minute yellow pubescence; remainder of thorax bright yellow. *Abdomen* only slightly contracted on second segment, remainder of segments barely wider, the abdomen at no point quite so wide

as thorax, shining bluish-black with very short inconspicuous pubescence; base of 3rd, 4th and 5th segments with a moderately broad lead-coloured band. *Legs* yellow; an indistinct broad brownish ring on apical half of hind femora; apical half of hind tibiæ blackish except broadly at tip; upper side of hind metatarsi brown, rest of hind tarsi black. *Wings* clear; subcostal cell dark brown except on the narrow basal part; halteres yellow.

Length, 8½ mm.

Described from one perfect ♀ in the Indian Museum from Cherrapunji, Assam, 2–8. x. 1914 (*Kemp*).

98. **Baccha sapphirina**, *Wied.*

Baccha sapphirina, Wiedemann, Aus. Zweifl. ii, p. 96 (1830); Verrall, Trans. Ent. Soc. Lond. p. 415 (1898).

♂ ♀. *Head* shining black, but with the frons more or less narrowly round sides in the ♂, and broadly across centre in ♀, also with the outer third on each side of face in ♀, dusted with blue-grey, leaving a broad shining median black stripe. Antennæ bright orange; proboscis black; postocular fringe white. *Thorax* shining æneous-black, dorsum with short white pubescence; scutellum similar, rather more cupreous in ♂; pleuræ with greyish dust and a little white pubescence. *Abdomen* mainly shining black; 1st segment deep blue, 2nd æneous, 3rd æneous on basal half, 4th broadly blue-greyish at base and less distinctly so at tip; also 5th and 6th segments wholly blue-grey. Pubescence whitish, longer at base and towards sides, shortest on dorsum. *Legs* orange; apical half of hind femora and of hind tibiæ, and tips of hind tarsi, to a greater or less extent blackish. *Wings* quite clear; subcostal cell wholly, and a moderately small, detached, clear-cut spot at tip of submarginal cell, always limited hindwards by 3rd vein, black; halteres conspicuously yellow.

Length, 8 mm.

Redescribed from three Indian specimens and a series in good condition in the British Museum from various localities in Africa. Coimbatore, S. India, vii. 1911; Abu, Rajputana (*Nurse*); Deesa, x. 1901 (*Nurse*). Recorded also from Ceylon and Aden (*Yerbury*).

Type in Copenhagen Museum.

99. **Baccha pulchrifrons**, *Aust.*

Baccha pulchrifrons, Austen, Proc. Zool. Soc. Lond. p. 139, pl. iv, figs. 10 (full insect col., ♂), 10 *a* (head, ♂), 11 (full insect col., ♀) (1893).

Baccha apicenotata, Brunetti, Rec. Ind. Mus. xi, p. 221, ♀, pl. xiii, fig. 8, part of wing (1915).

"In ♂, front, upper part of the face immediately below the antennæ, and a broad facial stripe reaching to the oral margin steely. In ♀, front, including whole circumference of antenniferous projection and a facial stripe, narrower than in the ♂, but

reaching to the oral margin, metallic black, sometimes steely; sides of face yellowish pollinose; cheeks orange-yellow, with a blackish-brown spot in front, more or less distinctly connected with the facial stripe, sometimes indistinct in the ♀ Front (including vertical triangle in ♂) and face clothed with pale yellow pile. Frontal triangle in ♂ dusted with yellowish pollen above; front in ♀, a little below the middle, with a triangular patch of pale yellow pollen on each side, the apices of the triangles meeting or narrowly separated in the median line. A distinct facial tubercle and antenniferous process, the latter somewhat more pronounced in the ♀ than in the ♂ A lunate spot on each side of the antenniferous process metallic-violet. Antennæ orange-yellow; 3rd joint oval, arista brown, yellow at the base. Occiput black, whitish pollinose, with a fringe of pale hairs. *Thorax* and scutellum: in ♂ metallic bronze-black, clothed with golden pile; in ♀ metallic blue-black, clothed with shorter whitish-yellow pile; in the ♂ a sometimes obscure yellowish vertical stripe on the pleuræ beneath the suture; in the ♀, humeri and a similar vertical stripe on the pleuræ light yellow, the stripe with whitish pile. General colour of the *abdomen* bronze-black with yellow markings; clothed with erect and rather long yellowish pile on the sides of the first three segments, and elsewhere with appressed pile, black on the black and whitish on the yellow portions; the sides of the 3rd and 4th segments in the ♂ are so curled round ventrally as to make the abdomen at the tip appear not more than double the width of the 2nd segment at the base; distal half of the abdomen of the ♀ spatulate; 1st segment reddish-yellow, brown on the hind margin, sometimes wholly brown or bronze-black in the ♂; 2nd segment bronze in the ♂, sometimes reddish on each side at the base, with a more or less distinct reddish-yellow transverse band on the second sixth from the hind margin; in some specimens the 2nd segment is wholly bronze-black in the ♂, except the posterior fifth, which is dull black; 2nd segment in the ♀ metallic black, with a reddish-yellow band on the second fifth from the hind margin, and sometimes reddish-yellow at the base; 3rd segment in the ♂ bronze on the basal and dull black on the apical third, with a quadrate yellow spot on each side in the middle; 3rd segment in the ♀ metallic black, with a yellow, somewhat triangular spot on each side in the middle, the apices directed outwards, and the bases inclined one towards another and sometimes narrowly meeting in the middle line in front; the posterior side of each triangle concave; 4th segment in the ♂ bronze-black, with a quadrate yellow spot on each side at the base, occasionally somewhat obscure, but when distinct deeply emarginate posteriorly, so that each spot shews a sharp angle projecting backwards on each side of the median line; 4th segment in the ♀ metallic black, with a yellow longitudinal stripe on each side of the median line, starting from the base and running the whole length of the segment, and a broader yellow elongated spot starting from the base of the yellow stripe on each side and

running obliquely outwards so as almost to cut off a basal angle; in some specimens the yellow longitudinal stripes become obsolete before reaching the hind margin of the segment, and in others apparently do not run more than half-way; 5th segment in the ♂ wholly metallic black; genitalia small, metallic black; 5th segment in the ♀ metallic black, with a somewhat confused repetition in miniature of the yellow markings on the 4th segment. *Legs* yellow; coxæ blackish-brown, and a band on the outer half of the posterior femora, not reaching to the tips, and the distal third of the posterior tibiæ, brown; there is sometimes an indication of an incomplete brownish ring round the middle of the posterior tibiæ. *Wings* in the ♂ sharper at the

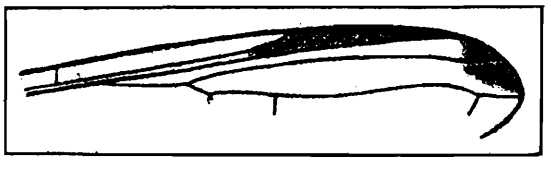

Fig. 24.—*Baccha pulchrifrons*, Aust., wing.

tip and with the terminal portion of the 4th longitudinal vein, closing the 1st posterior cell, more oblique than in the ♀; suffused with brown, usually lighter at the base on the inner side, darker in the costal and subcostal cells and in the middle, and with the stigma and an elongated and not sharply defined spot at the tip, above the 3rd vein, dark brown; wings in the ♀ hyaline, the subcostal cell brown, and the stigma and an elongated spot at the tip above the 3rd vein, as in the ♂, dark brown; 3rd longitudinal vein gently curved; alulæ of full size.

"*Length*, ♂ 10–11½; ♀ 9¾–10¾ millim."

Bhowali, W. Himalayas, 5700 ft., vii. 1909 (*Imms*); Darjiling District, 5000 ft., iv., v. 1917 (*Kemp*); Pusa, Bengal, 10. ii. 1906 (*Misra*); 3. viii. 1909; Mormugao, Goa, ix. 1906 (*Kemp*); Hot Wells, Trincomalee, 2. xi. 1890 (*type* ♂ of *apicenotata*), 13. iii. 1892 (*type* ♀ of *apicenotata*); Heneratagoda and Bentota (both Ceylon, *E. E. Green*); Cherrapunji, Assam, 4400 ft., 2–8. x. 1914 (*Kemp*); jungle at base of Dawna Hills, 1. iii. 1908 (*Annandale*). The species is recorded by de Meijere from Singapore and Java, and the British Museum has specimens from various localities in Ceylon collected by Col. Yerbury in March, June, July and November.

Austen notes a ♂ and ♀ which may be a variety of this species.

100. **Baccha triangulifera**, *Aust.*

Baccha triangulifera, Austen, Proc. Zool. Soc. Lond. p. 138, pl. iv, fig. 5 (full ins. col., ♂) (1893).
Baccha elegans, Brunetti, Rec. Ind. Mus. xi, p. 220 (1915).

♂ ♀. *Head*: "Front, face and cheeks yellow, with short, pale yellow pile; a narrow dark brown median stripe extending a little

more than half-way down the face from the antennæ. Vertical triangle in ♂ shining black, very long and narrow, extending more than one-third of the distance between the occiput and antennæ. Front of ♀ with a brownish triangular spot immediately above the antennæ; very narrow above, metallic black, with parallel sides for one-half of its length from the occiput. Occiput dull black, pollinose, with a fringe of glistening whitish hairs. Antennæ orange, 3rd joint bluntly oval; arista brown, except the base. *Thorax* metallic black, finely punctuate, with very short silky yellowish pile; humeri, a stripe from them to the suture, a vertical stripe on the pleuræ in front of the suture, a large rounded spot below this stripe, an oblique elongated spot behind the base of the wings, and the anterior margin of the scutellum, pale yellow. Scutellum, except anterior margin, blackish-brown, punctate. *Abdomen* cylindrical and very narrow from posterior half of 1st segment to middle of 3rd, expanding and spatulate from thence to the tip; general colour reddish-brown, clothed with short appressed, blackish pile; 2nd segment with fine, whitish, erect pile on the sides; a very conspicuous translucent yellow spot occupying distal third (rather more in ♀) of the 3rd segment, and shaped like an equilateral triangle; 1st segment yellow, brown at the tip; 2nd segment reddish-brown, darker at the tip, before which is a narrow indistinct lighter band; base of 3rd segment yellowish, posterior margin brown; 4th segment polished dark brown, steely on posterior margin in ♂; 5th segment polished dark brown, with a steely sheen; external genitalia reddish in both sexes, rather prominent in ♂ *Legs* luteous, coxæ blackish-brown, posterior femora reddish-brown, yellowish at the base; posterior tibiæ pale yellow on basal third, then dark brown; 1st joint of posterior tarsi dark brown except at the tip; this and the remaining joints dull yellow. *Wings* hyaline with a brownish tinge along the posterior margin; subcostal cell dark brown, and a brownish patch at the distal extremity of the marginal and submarginal cells, terminating sharply at the 3rd vein; the latter straight; veins dark brown; alulæ almost absent.

"In the shape of the profile of the face and in the venation of the wing, this species resembles *B. pedicellata*, Dol. (according to Doleschall's figure), from Java; but the sharply defined yellow triangle on the 3rd abdominal segment distinguishes the species from any other known to me.

"Huldamulla, Ceylon, *circa* 4000 ft. (*Col. Yerbury*): a pair taken *in copulâ*, June 10, 1892."

Length, 12½–13 mm.

As *elegans* I described the species from Sukna, base of Darjiling Hills, 500 ft., 1 & 2. vii. 1908, including *type*; and from jungle at base of Dawna Hills, 1. iii. 1908 (both *Annandale*). Other specimens are from Kollur Ghat, S. Kanara District, 3000 ft., 18–21. ix. 1913; Rungpo, Sikkim, 1400 ft., 6. ix. 1909. The latter specimen has the face wholly pale, but is no doubt conspecific with the rest. None of the specimens seen by me have

the hind margins of the wings brownish-tinged, as stated by Major Austen.

Types in British Museum.

101. **Baccha amphithoe**, *Walk.* (Pl. III, fig. 12.)

Baccha amphithoe, Walker, List Dipt. Brit. Mus. iii, p. 549 (1849).
Baccha flavopunctata, Brunetti, Rec. Ind. Mus. viii, p. 165, pl. vi, figs. 5, 6 (1913); id., op. cit. xi, p. 219.

♂ ♀. *Head*: vertex and frons shining metallic black, a little yellow on lower part of frons at sides bearing yellow dust; in ♀, an indistinct narrow median line on frons. Antennæ orange-yellow, antennal prominence hardly noticeable. Face and cheeks yellow, a clear-cut black or blue-back stripe on face from antennæ to mouth; a small tubercle on face; below mouth-opening shining steel-colour. Occiput dark grey- or yellow-pollinose, with short whitish-yellow fringe on margins. *Thorax* dark æneous to metallic-black, with short golden-yellow pile; yellow calli on humeri, an oblong one thence to suture; a perpendicular oblong stripe on meso-pleura; a round spot just below it on sternopleura; a long oblique spot behind wings, with a small round spot contiguous to its lower

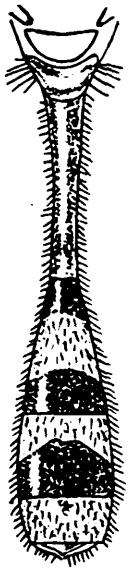

Fig. 25.—*Baccha amphithoe*, Walk., abdomen.

end. Scutellum yellowish, brownish in middle, with some grey pubescence. *Abdomen*: 1st segment pale yellow; 2nd very narrowed, pale brown, with a yellowish band before hind margin; 3rd yellowish at base with a reddish-brown triangular patch on each side margin, more distinct in ♀, and reaching hind margin, which latter bears a sharply defined blackish band; middle of segment yellowish; 4th segment yellowish; basal angles, sides and a large, rather triangular spot resting on hind margin, black; the sides of this segment are addicted to curling under the belly; 5th segment with a blackish median basal spot, indistinct in ♂. Venter more or less as dorsum. *Legs*: coxæ black; anterior legs (except coxæ) wholly bright yellow down to tips of tarsi; a broad median band on hind femora, and the apical half of hind

tibiæ, dark brown or black; upper side of hind metatarsus rich dark golden-brown, the colour more or less extending to the under side, which is covered with golden-brown hair; remainder of hind tarsi orange-yellow. *Wings* clear grey; subcostal cell blackish, costal cell and about the basal half of the marginal cell brownish, and the costa from the end of the stigma to the tip of the 3rd vein, narrowly and distinctly black suffused. Halteres yellow.

Length, 9–11 mm.

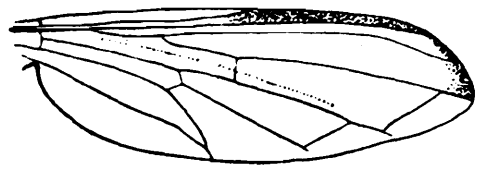

Fig. 26.—*Baccha amphithoe*, Walk., wing.

The above is the amalgamation of my description of *flavopunctata* (built up on a single ♀ in the Indian Museum from Dibrugarh, Assam, 17–19. xi. 1911 (*Kemp*)) with Austen's description of Walker's *amphithoe*, with which species my species is, as proved by examination, identical. Walker described the species from a single headless specimen in the British Museum from Moulmein; whereas Austen's re-description is from several of both sexes. Sibpur, Bengal, 4. iv. 1913 (*Gravely*); Calcutta (*Gravely*); Sukna, Rungpo, Sikkim, 6. ix. 1909; Cherrapunji, Assam, 4400 ft., 2–8 x. 1914 (*Kemp*); Moulmein (*Yerbury*); Kanthalai, 8. iii. 1892; Kottawa, 24. iv. 1892; Trincomalee; Galle (all Ceylon, *Yerbury*). I surmise that *pedicellata*, Dol., *vespæformis*, Dol., and *gratiosa*, Big., are closely allied to *amphithoe*.

Genus **RHINOBACCHA**, *de Meij.*

Rhinobaccha, de Meijere, Tijd. v. Ent. li, p. 315 1908).

Genotype, *R. gracilis*, de Meij.; t. c. p. 316, ♂ ♀, pl. viii, fig. 38, head (profile).

Body narrow. Eyes bare; in ♂ not conspicuous, a little wider apart in ♀; antennæ short, 3rd joint rather longer than broad, arista bare. Epistome produced downward into a long snout as in *Rhingia*; proboscis long, about $1\frac{1}{2}$ times height of head in the type-species. *Abdomen* narrow, only a little broader at tip. Hind femora not thickened, not spinose. *Wings* narrow, alulæ rudimentary; cross-veins bent towards the wing-tip, nearly parallel to the wing-border.

This genus possesses some of the characters of *Rhingia*, *Baccha* and *Sphegina*: the epistome of the first, the venation of the second and the rudimentary alulæ of the third, and it has the basally narrowed abdomen common to the two latter. From *Ocyptamus*, *Spathiogaster* and *Doros* it is distinctly differentiated by the prominent epistoma.

Range. Ceylon, India; *R. gracilis* being the only species.

102. Rhinobaccha gracilis, *de Meij.*

Rhinobaccha gracilis, de Meijere, Tijd. v. Ent. li, p. 315 (1908); Brunetti, Rec. Ind. Mus. xi, p. 225 (1915).

♂ ♀. *Head*: frons in ♂ rather narrower than in ♀, shining black, only at sides narrowly yellow. Antennæ short, 3rd joint rather longer than broad, oval, darkened on apical half, in ♂ 1st joint darkened on inner side. Epistome yellow, with a very broad shining black longitudinal stripe above, which is a continuation of the frontal stripe; towards hind corners of eyes, face black for a considerable space. *Thorax* shining black; humeral calli and a callus-like stripe from thence to wing-base, sulphur-yellow. Scutellum black, anterior margin with a faint yellowish-white border; the bristly hairs on hind border black. Sides of thorax shining black, a yellow spot behind wing-base. *Abdomen* long and narrow, linear, shining black; 1st and 4th segments with

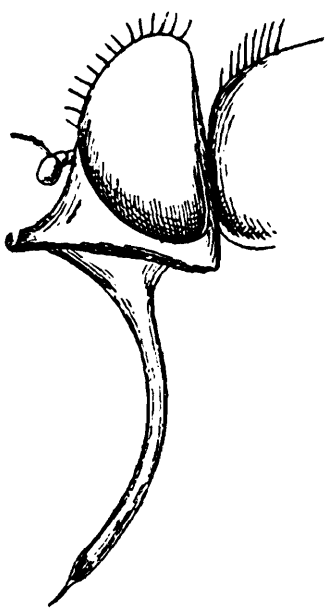

Fig. 27.—*Rhinobaccha gracilis*, de Meij., head in profile.

oblique narrow yellow spots, which nearly or quite reach side border; base of abdomen with some long yellowish-white pubescence. *Legs* yellow; hind tibiæ and tarsi blackish-brown, also the hind femora are darker on upper side; middle tibiæ below with a fringe of long yellow hairs. *Wings* rather brownish, long and narrow; stigma dark brown; halteres yellowish-brown.

Length, 6 mm.

The description is a translation of de Meijere's. The species was described from a single ♂ and ♀ from Pattipola, Ceylon, 2000 metres (*Biro*), in the Hungarian Museum. The Indian Museum has a specimen from the same locality as the type, 3. vii. 1910.

Genus **RHINGIA**, *Scop.*

Rhingia, Scopoli, Ent. Carn. p. 358 (1763); Brunetti, Rec. Ind. Mus. ii, p. 57, notes and table of Oriental spp. (1908).
Rhyngia, Rondani, Dipt. Ital. Prod. ii, p. 171 (1857).

GENOTYPE, *Conops rostrata*, L.; by original designation.

Head slightly broader than thorax, often somewhat flattened in front: eyes bare, closely contiguous in ♂ for some distance, separated by a moderately broad frons in ♀. Face descending perpendicularly from below antennæ, the central and lower part produced into a long conical snout; antennæ normal, 3rd joint elongate, arista practically bare. *Thorax* subquadrate, densely pubescent but often not conspicuously so; scutellum rather robust, nearly semicircular, clothed as thorax, often yellowish. *Abdomen* about as broad as thorax, shortly oval. *Legs* simple. *Wings* as in *Syrphus*, 3rd vein with a few hairs along base.

Life-history. The early stages are said to be passed in cow-dung.

Range. Europe, Japan, Orient, West and South Africa, North America.

A very conspicuous, natural group of species, easily recognised by the long snout. They frequent flowers and sunny spots in woods, and are given to hovering over paths and under trees, especially the males. Nearly always of brown colour with black markings, or blackish with brown or orange markings, but a few African species are brilliant blue.

Table of Species.

1. Pleuræ wholly brownish-orange (scutellar hind border with a row of erect black bristly hairs) — *cincta*, de Meij., p. 130.
   Pleuræ greenish-grey or æneous-grey, never yellowish . . . . . 2.
2. Scutellum wholly with soft long yellow pubescence, no bristly black hairs on hind border . . . . . *binotata*, Brun., p. 131.
   Scutellum with yellow hairs on disc and a conspicuous row of erect black bristly hairs on hind margin . . . . . 3.
3 (*a*). Second, 3rd and 4th abdominal segments mainly black: a pair of distinct oblong spots in middle of side margin of each, all subequal, their inner ends well separated . . . . . *sexmaculata*, Brun., [p. 131.
   (*b*). Second, 3rd and 4th abdominal segments mainly yellowish, with black elongate spots towards each side on hind margin. — *laticincta*, Brun., p. 132.
   (*c*). Third and 4th abdominal segments slightly shining, dull olive-green, the colour extending to hind corners of 2nd segment; hind margins of 2nd, 3rd and 4th segments distinctly but very narrowly shining black, uninterrupted . — *angusticincta*, Brun., [p. 133.

(*d*). Third and 4th abdominal segments a little shining, greenish-æneous; hind corners of 2nd segment black; hind margin indefinitely blackish; 3rd segment with distinct, broad blackish margin, not conspicuous; 4th segment with indistinct black hind margin. . . *semicinerea*, sp. n., [p. 134.

103. **Rhingia cincta**, *de Meij.* (Pl. III, fig. 13.)

Rhingia cincta, de Meijere, Bijd. tot Dierk. xviii, p. 101 (1904).

♂ ♀. *Head* in ♂ with bare eyes, closely contiguous for the whole distance from the small vertical triangle to the equally small frontal one; former black, with ruby-red ocelli and long brown hairs curved forward; latter orange-brown with a little paler dust: face and lower part of head orange-brown, the snout projecting forwards a distance equal to the width of the eye seen in profile, shining, bare. Antennæ and arista brownish-orange, latter bare. Occiput grey, lower part orange-brown, both with a little very short marginal pale pubescence. Frons in ♀ just perceptibly broader below than above, flush with eyes, about one-fifth of head at level of antennæ, blackish, with pale yellowish-grey dust. *Thorax* brownish-orange; dorsum olive-grey except side margins, the grey colour outlined on each side by a longitudinal black stripe of moderate width; a pair of median, similar, rather narrowly separated stripes, often united on anterior margin. Pubescence of dorsum brownish-yellow, some small black bristles or bristly hairs in front of wing and on posterior calli. Pleuræ with a little yellowish-grey tomentum and pale yellow soft pubescence. Scutellum orange-brown with soft black pubescence, hind margin with a row of erect black bristly hairs and a fringe of dependent yellow hairs. *Abdomen* mainly black; 1st segment, and the 2nd anteriorly at sides, orange, more or less broadly a little darker on anterior margin; sometimes a narrow black median stripe on 1st segment; 3rd segment in ♂ black, with an elongate dull orange spot at middle of each side margin; in ♀ the spots joined, forming a narrow band across centre of segment, much broadened at side margins (in one ♀ this segment is all shining black); 4th segment practically wholly black. Pubescence of abdomen yellow on pale parts and black on remainder. Venter more or less brownish-orange, blackish towards sides and tip. *Legs* orange with pale yellow pubescence except for a little very short black bristly pubescence on hind tibiæ, which latter are a little brownish, and the usual microscopic black bristles on upper side of tarsi. *Wings* pale yellowish, stigma barely darker; halteres brownish-orange.

Length, 9–10½ mm. to tip of snout.

Redescribed from a ♂ from Darjiling, 12. viii. 1909 (*Dr. Jenkins*); and some ♀ ♀ from Kurseong, Darjiling District (*Annandale*), 4. vii. 1908, 13–16. vii. 1907; above Tura, Assam, 15. vii.–30. viii. 1917 (*Kemp*); all in the Indian Museum in good condition. Originally described from Java.

104. **Rhingia binotata**, *Brun.* (Pl. III, fig. 14.)

Rhingia binotata, Brunetti, Rec. Ind. Mus. ii, p. 59, ♂ (1908); id., op. cit. viii, p. 166, ♀ (1913); xi, p. 226 (1915).

♂ ♀ *Head*: frons and upper part of snout deep black; lower part of both face and snout tawny-yellow. Antennæ brownish-red. Vertex very small, with a few black hairs; short yellow hairs behind the head above, and rather close whitish hair on lower part; proboscis black. Frons in ♀ one-fifth of head, dark grey, uniformly wide. *Thorax* yellowish-grey, with four rather indistinct, slightly darker, dorsal stripes; the two outer ones wide, and interrupted at the suture; the two inner ones very narrow and close together. Dorsum with rather thick, short bright yellow hair; sides of thorax cinereous-grey, darker posteriorly, some yellow hair just below wings; scutellum bright tawny, dorsum bare, a fringe of short yellow hairs at base, and a fringe dependent from posterior margin, on which margin is set another fringe of long yellow hairs, projected posteriorly; by which character this species differs from all the others. In ♀, thorax grey and general pubescence in this sex grey instead of yellow. *Abdomen* æneous-black, covered with thick, short, bright yellow hair; the 1st segment appears pale, and on the 2nd on each side, towards the base, is a lateral, oval, pale yellow spot. *Legs* orange-yellow, basal half of all femora black; the femora with soft yellow hair, the rest of the legs practically bare. *Wings* yellowish-grey, slightly darker in front; stigma pale yellowish-brown; halteres yellowish-brown.

Length, 9 mm.

Described from one ♂ in perfect condition, captured by me at Darjiling, 13. x. 1905. In my collection. A second ♂ comes from Kurseong, 3. vii. 1908 (*Annandale*). The ♀ subsequently received at the Indian Museum from the banks of the Siyom River, near Yekshi, 3. ii. 1912, taken on the Abor Expedition. A fourth specimen from Darjiling, 1908.

105. **Rhingia sexmaculata**, *Brun.* (Pl. III, fig. 15.)

Rhingia sexmaculata, Brunetti, Rec. Ind. Mus. viii, p. 166 (1913).

♀ *Head*: frons rather more than one-fourth the width of the head, just perceptibly narrower at vertex; ground-colour æneous, dusted with brownish-yellow, with short, comparatively fine black hairs; ocelli red, distinct, placed on an impressed triangle; face immediately below antennæ concolorous, snout orange, comparatively short, being only as long as the lateral width of the eyes; haustellum blackish, mouth-parts brownish-yellow. Antennal protuberance of moderate size, concolorous with frons; antennæ wholly orange, upper margin and tip of 3rd joint very narrowly brownish, arista black. *Thorax*: ground-colour æneous, dusted with brownish-yellow; two narrow, closely approximated median lighter stripes, and an outer under stripe on each side, none of the

stripes very obvious;. scutellum concolorous, hind margin very narrowly brownish-yellow; dorsum with a few short black hairs; sides of thorax concolorous, a little pale yellow hair about pleuræ and base of wings. *Abdomen* blackish, 1st segment pale whitish-yellow except for the dark posterior corners; 2nd, 3rd and 4th segments each with a pair of well separated oblong yellowish spots (about as wide as one-third the length of the segment), placed towards but not on the anterior margin, their extremities attaining the lateral margins of the segments; a little yellowish hair at the sides of the abdomen, basally; venter blackish. *Legs* brownish-yellow; coxæ and extreme base of femora black; tips of tarsi a little brown; femora with a very little pale hair. *Wings* clear yellowish-grey; stigmatic region of subcostal cell yellowish; tegulæ brown with yellow fringe; halteres brownish-yellow.

Length, 8 mm.

Described from one ♀ in the Indian Museum from Dibrugarh, Assam, 17 xi. 1911 (*Kemp*).

106. **Rhingia laticincta**, *Brun.*

Rhingia laticincta, Brunetti, Rec. Ind. Mus. ii, p. 58 (1908); i, pl. xi, fig. 7, abdomen (1907).

♂ ♀ *Head*: snout tawny; lower part of head shining grey; antennæ tawny; eyes quite contiguous as far as vertex; frons in ♀ of about the usual width in the genus, cinereous-grey. *Thorax* cinereous-grey, with æneous reflections and soft black and grey hair; four blackish longitudinal stripes, not always very distinct, the two outer ones interrupted at the suture, the two inner ones close together on the front, diverging widely posteriorly, where

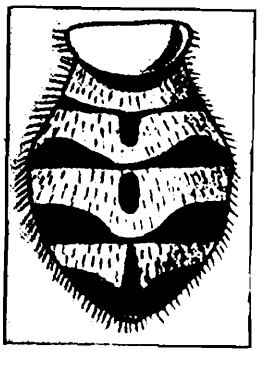

Fig. 28 *a*.—*Rhingia laticincta*, Brun., typical form ♂ ♀, abdomen.

they become diffused and meet the ends of the outer pair just in front of the scutellum. Scutellum unicolorous, similarly haired, a row of stiff black hairs on posterior edge, from which a fringe of soft pale yellow hair hangs down. *Abdomen* bright tawny, with soft yellow hair, thickest at the base on the sides; 1st segment very narrowly black-edged, 2nd, 3rd and 4th with a broad black band on posterior border, interrupted in the centre in front, but continuous on the extreme edge of the segment; a vertical long

black spot on the dorsum of each segment forms a sort of longitudinal dorsal stripe. Venter tawny-brown. *Legs* all pale tawny, all femora black at base, an indistinct blackish wide ring round centre of hind tibiæ; tarsi darker. In ♀, femora nearly all pale and the ring on the hind tibiæ less distinct. *Wings* pale grey, stigma yellowish.

Length, 7–9 mm.

Described from the *type* ♂, Darjiling District, 9000–12,000 ft. (*Burkill*); the *type* ♀, Mussoorie, both in the Indian Museum, and a ♂ and ♀ in my own collection. Simla (*Annandale*); viii., ix. 1898 (*Nurse*); Phagu (*Annandale, Kemp*); Kurseong, 4700–5000 ft.

Var. **fasciata**, *Brun.*

Rhingia laticincta var. *fasciata*, Brunetti, Rec. Ind. Mus. ii, p. 58 (1908); i, pl. xi, fig. 8, abdomen (1907).

♂ ♀ What I take to be a variety of *laticincta* differs by the abdominal bands being reduced to semi-circular spots, placed on the posterior borders of the segments and joined by a very narrow line on the extreme edge. The legs in the ♂ are paler, and shew only very slight traces of black at the base of the femora; in the ♀ they are wholly pale, almost livid, with only the faintest

Fig. 28 *b*.—*Rhingia laticincta*, Brun., var. ♂ ♀, abdomen.

indication of a dark band on the hind tibiæ. Another point of difference is that the pubescence on the thorax is much shorter, and almost absent on the posterior part, and the scutellum is practically bare, except for some long hairs towards the tip.

I have four specimens (♂ ♂ ♀ ♀) taken by myself at Darjiling (7000 feet), 10–15. x. 1905, and am not at all sure that it is not specifically distinct, for which reason I have given it a name. In my collection.

107. **Rhingia angusticincta**, *Brun.* (Pl. III, fig. 16.)

Rhingia angusticincta, Brunetti, Rec. Ind. Mus. ii, p. 59 (1908).

♂ ♀ This species resembles *laticincta*, the points of difference being as follows: the snout is distinctly shorter; the abdominal

transverse bands are extremely narrow, and not interrupted, this being the main, but a constant difference.

Length, 8 mm. (without snout).

Described from the *type* ♂ from between Kufri and Simla, 7000 ft., 4. vii. 1907, and the *type* ♀ from Theog, 27 iv. 1907 (both *Annandale*). A third specimen from Darjiling District, 9000–12,000 ft. (*Burkill*): this latter has a darker thorax and all the tibiæ have a distinct broad black ring. I have seen a specimen from Dungagali, 21–24. v. 1915 (*Fletcher*).

108. **Rhingia semicinerea**, sp. nov.

♂ *Head*: vertex small, black, with a few black hairs; frons blackish above with grey dust towards sides, gradually changing in colour to the brownish-orange of lower frons and orange of face and snout; latter projecting horizontally as far as width of eyes in profile. Antennæ and arista orange. Lower part of head æneous-black; occiput with close grey dust; short black bristly hairs on upper, and softer pale hairs on lower, margin. *Thorax* wholly dull green-æneous, with brownish-yellow pubescence and distinct traces, seen from behind, of a pair of moderately broad greyish dust-stripes, rather close together but visible on anterior part of dorsum only; humeri brownish-orange; a little grey dust in humeral region; scutellum concolorous, with yellowish hairs on dorsum and a fringe of them dependent from hind margin, which latter is narrowly orange, bearing black bristles. *Abdomen*: 1st and 2nd segments mainly orange, both with very narrow black hind margins; 2nd with also a narrow median stripe and a large black spot on each side on hind margin; 3rd and 4th greenish-black, hind margin of 3rd broadly blackish, of 4th indistinctly blackish with a slight æneous tinge; remainder, with venter, greenish-black, latter yellowish at base. *Legs* brownish-orange with pale pubescence; hind tibiæ a little brownish about the middle. *Wings*, squamæ and halteres yellowish.

Length, 10 mm. from tip of snout to tip of abdomen.

Described from a single ♂ in tolerably good condition, in Indian Museum, from Naini Tal, June 1893, received from the Lucknow Museum.

Subfamily VOLUCELLINÆ.

Antennæ moderately long, and even if elongate, mainly pendent, arista normally conspicuously plumose *; face very considerably produced into a blunt or more conical snout, sometimes (*Lycastris*) of considerable length. *Body* usually robust, not linear or attenuated. *Legs* simple. *Wings* with marginal cell closed or open;

* Bare, or nearly so in some species of *Graptomyza*.

3rd vein not looped downward into 1st posterior cell; 4th vein distinctly recurrent at tip, ending some distance from wing-border; anterior cross-vein before middle of discal cell.

The VOLUCELLINÆ are large, handsome flies with the appearance of bees or wasps. Their larvæ feed on the dead or diseased larvæ and pupæ in the nests of social Hymenoptera. One common European species, *Volucella bombylans*, L., perfectly mimics two common humble bees (*Bombus*) of quite different appearance, and occasional specimens resemble other species of *Bombus**.

The group is essentially a tropical one, the species of the East being even surpassed in size by those of Central America and the adjacent regions. The subfamily seems to be a natural one. In one genus (*Graptomyza*) the spurious vein is absent, an almost unique instance in the family, and some authors have desired to remove the genus on that account, but its natural position is undoubtedly here.

Table of Genera.

Marginal cell closed (vena spuria present; 4th vein strongly recurrent at tip)	[p. 144. VOLUCELLA, Geoffr.,
Marginal cell open.	
Vena spuria absent; apical portion of 4th vein strongly divergent from wing-border; body short, stout, abdomen rounded or shortly ovate	[p. 135. GRAPTOMYZA, Wied.,
Vena spuria present; apical portion of 4th vein mainly parallel with wing-border, but just appreciably recurrent at tip; body more elongate; whole facies like that of *Chilosia*.	[p. 153. ENDOIASIMYIA, Big.

Genus **GRAPTOMYZA**, *Wied.*

Graptomyza, Wiedemann, Auss. Zweifl. ii, p. 206 (1830).

GENOTYPE, *G. ventralis*, Wied., the first species; by present designation.

Head as broad as or broader than thorax, transverse; epistome produced as a conspicuous snout, projecting diagonally downwards, varying in length in different species; proboscis elongate, thin, bifid at tip. Antennæ with 1st and 2nd joints small, 3rd very elongate, three or four times longer than deep, porrect or somewhat drooping, compressed, arista practically or absolutely bare or conspicuously plumose. *Thorax* short, subquadrate with rounded corners; humeri with posterior calli generally very distinct, softly pubescent but with a distinct chætotaxy, generally consisting of one or two presutural bristles, three supra-alar or post-alar, two or three on posterior calli, two notopleural and a row on hind margin of dorsum; also scutellum with side margin

* The several species and varieties of *Volucella* are not, however, always found in the nests of the particular species of Hymenoptera which they respectively resemble. See Lundbeck, Dipt. Danica, v, p. 400 (1916).

bearing strong bristles, or with a general row of numerous bristles on hind margin, this system apparently slightly varying with the species. *Abdomen* shortly oval or a little narrowed at tip, very arched, thick, softly pubescent. *Legs* comparatively short and weak, never incrassated nor in any way armed. *Wings* of normal size, but venation unique in the whole family owing to absence of

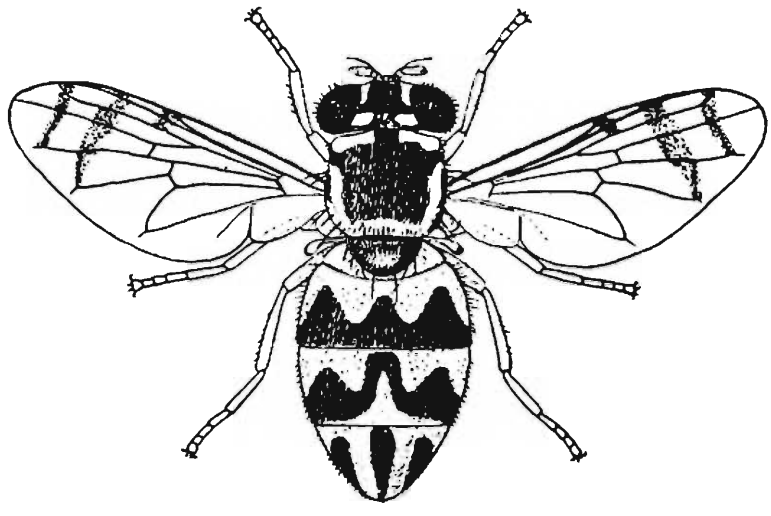

Fig. 29.—*Graptomyza brevirostris*, Wied., ♀

the "spurious vein"; 3rd and 4th longitudinal veins bent sharply upwards towards tips, generally at a right or acute angle, the apical section nearly or quite straight. Anal angle of wing and alulæ well developed; squamæ of normal size, with fringes.

Range. The Orient; also one species each from Sierra Leone, East Africa, and Natal. De Meijere gives a table of seven Oriental species, with notes.

Table of Species.

1.	Arista bare or practically so . . .	2.
	Arista conspicuously plumose	4.
2.	Wings marked	3.
	Wings unmarked	*flavonotata*, Brun., p. 137.
3.	Band on 2nd and 3rd abdominal segments in the form of a hind marginal belt, slightly narrowing towards sides, with anterior edge extended forward in middle and towards (but not actually at) side margins, thus forming three obtuse triangles	*brevirostris*, Wied., p. 138.
	Band on 2nd, 3rd and 4th abdominal segments in the form of a hind marginal belt, slightly narrowed towards sides, and with a short median linear stripe connecting it with front border of segment	*tinctovittata*, Brun., p. 139.
4.	Wings marked	*longirostris*, Wied., p. 140.
	Wings unmarked	5.

5. Third and 4th abdominal segments all black except dull orange towards extreme side margins; coxæ black	[p. 141. *angustimarginata*, sp. n.,
Second, 3rd and 4th abdominal segments narrowly black on extreme side margins; rest of ground-colour of dorsum yellowish, with a large transverse spot (*ventralis*), or two large spots (*sexnotata*), on 2nd segment, and a pair of large spots on 3rd and 4th, all these spots filling a considerable part of the surface, especially in *ventralis*; coxæ yellowish	6.
6. Spots on 2nd, 3rd and 4th segments well separated	*sexnotata*, Brun., p. 142.
Spots on 2nd segment united as one large one; those on 3rd and 4th segments practically filling dorsum except for the narrow black side margins and a narrow longitudinal space between them; emarginations of 3rd and 4th, also of 4th and 5th, segments pale. .	*ventralis*, Wied., var. *nigripes*, Brun., p. 143.

109. **Graptomyza flavonotata**, *Brun.* (Pl. III, fig. 18.)

Graptomyza flavonotata, Brunetti, Rec. Ind. Mus. xiii, p. 86 (1917).

♀ *Head* wholly lemon-yellow, sparsely beset with short pale hairs; frons and face with parallel sides just over $\frac{1}{3}$ of head in width; vertical triangle black, ocelli red; epistome about half as long as height of eyes, with a few black stiff hairs at tip; proboscis brownish-yellow, black towards tip. Antennæ with first two joints dark brown, bristly, upper half of 3rd joint dark brown, lower half brownish, yellow arista microscopically pubescent; antennal prominence shining brownish-yellow with some stiff black hairs. *Thorax* lemon-yellow; whole dorsum from anterior to posterior margin, but leaving fairly broad side margins, shining black, with rather dense short pale yellow pubescence; two small oval well separated lemon-coloured spots on hind margin, placed longitudinally. Scutellum yellow, with a slightly brownish tinge and a marginal fringe of long stiff pale bristly hairs. Sides of thorax black; an inverted pear-shaped lemon-yellow spot of considerable size on sternopleura, with two smaller oval ones placed longitudinally lower down, one under the larger spot, the other below the wing-base; a round pale yellow spot on the propleura. Bristles all very weak, yellow, apparently some may be absent; only one notopleural; three side marginal, black, on scutellum as in *tinctovittata*. *Abdomen* brownish-yellow, darker brown on apical half; 2nd segment with three black spots on hind margin, the outer two oval, placed longitudinally and clear of the side margin, the middle one roughly triangular, the apex pointing forward; 3rd segment with two similar oval side-spots, the oval middle one placed nearly on anterior margin;

4th segment with a pair of oval side-spots considerably obscured by the brownish ground-colour; whole abdomen minutely pale pubescent. *Legs* lemon-yellow, hind coxæ and tips of tarsi blackish; tip of hind femora broadly, and hind tibiæ and tarsi wholly, black. The minute pubescence is yellow and black respectively, agreeing with that of the ground-colour. *Wings* almost clear, stigma pale brown; halteres lemon-yellow.

Length, $3\frac{1}{2}$ mm.

Described from a single specimen in the Indian Museum, taken between Kufri and Phagu, Simla District, 21. v. 1916 (*Annandale & Kemp*).

110. **Graptomyza brevirostris**, *Wied.*

Graptomyza brevirostris, Wiedemann, Auss. Zweifl. ii, p. 209 (1830); de Meijere, Tijd. v. Ent. li, p. 277 (1908).

♀ *Head*: frons and face jointly very gradually narrowing from vertex to snout, at no place quite $\frac{1}{3}$ of the head, both yellow; frons with a large oblong black spot leaving only side margins narrowly yellow; a short narrow stripe connecting it with vertex; a broad black stripe, filling fully middle third of face, from base of antennæ to tip of the comparatively short snout, which is from half to two-thirds as long as height of eyes; cheeks black but hind corners of lower part of head yellow. Eyes microscopically pubescent. Antennæ black, 3rd joint dull orange below, sometimes all black; arista bare, orange, tip blackish. Occiput black, margin nearly bare; pubescence of head yellow, short. *Thorax* shining blackish; sides of dorsum, hind margin, humeri and a small contiguous spot on inner side of them, a small isolated spot below each humerus, posterior calli, and a short vertical broad stripe on mesopleura, yellow. Pubescence short, whitish; scutellum black, hind margin more or less brownish, with long upcurved black bristles; chætotaxy normal. *Abdomen* orange-yellow; 2nd segment with a broad black band on hind margin, extending forward in middle and towards sides, but clear of side margins, in the shape of three blunt triangles nearly attaining front margin of segment, the colour extending along the extreme side margins of segments 3 and 4 almost to tip of abdomen; 3rd segment with a similar cross-band to that of 2nd, but the band is emarginate in centre of hinder side, thus forming a rather large yellow triangle; 4th segment with three longitudinal elongate black spots, the median one nearly attaining front margin, the outer ones foreshortened, all of them nearly reaching hind margin and well separated from one another and from the black extreme side margin of segment. Venter practically all yellowish; pubescence of abdomen whitish. *Legs* all yellow; coxæ, apical half of hind femora and all hind tibiæ black. *Wings* pale grey; stigma smoky-black, small but moderately distinct; there is a small similarly shaped spot in the cell below, this spot

and the stigma forming together a short broad stripe; a longer dark brown stripe from near tip of 2nd vein extending hindwards, embracing outer side of discal cell and ending on hind margin of wing; a short third stripe from tip of 3rd vein passing along outer side of the closed 1st posterior cell, reaching 4th vein. Halteres orange.

Length, 6 mm.

Redescribed from two ♀ ♀ in the Indian Museum. Nilgiri Hills, 3500 ft., v. 1910 (*H. L. Andrewes*): Ceylon; Bank of Dihong River, Rotung, 1400 ft., 25. xii. 1911 (*Kemp*); Tavoy, Tenasserim, xii. 1897 (*Bingham*); Taungòo, Lower Burma, v. 1918 (*Bingham*); Singapore (*Ridley*). Described by Wiedemann from Westermann's collection, from Java; also recorded from the Nicobars.

The abdominal black bands vary from a practically linear band (with a slight subtriangular projection on the anterior margin) on the hind margins of 2nd and 3rd segments, to a band of which the anterior margin forms three conspicuous curves which nearly touch the front margin of the segment. The band on the 4th segment is similar to that on the 3rd, but the middle curve is truncate anteriorly instead of bluntly conical as on 2nd segment. The markings of the 4th segment are pretty constant in all the varieties, consisting of a median and two side stripes all black, of moderate width and reaching from about anterior to hind margin.

111. **Graptomyza tinctovittata**, *Brun.*

Graptomyza tinctovittata, Brunetti, Rec. Ind. Mus. xi, p. 227, pl. xiii, fig. 10, wing (1915).

♀ *Head* pale lemon-yellow; face with a shining brown median stripe from antennæ to mouth-border; snout about half as long as height of eyes; proboscis short. Occiput black, the colour encroaching narrowly on the vertex. Frons with a very large subquadrate, blackish-brown, moderately shining spot, which occupies nearly all the surface, not contiguous to the eyes, but extending downwards to the root of the antennæ; this square spot joined to the vertex by a short, broad stripe embracing the ocelli. Eyes sparsely and microscopically hairy. Antennæ brownish-yellow, upper side a little brownish, arista bare. *Thorax* shining black, with short yellowish-grey pubescence; side margins and posterior margin of dorsum narrowly pale yellow. Shoulders with a yellow callus, and there is an elongate perpendicular yellow spot on the mesopleura, just before the wing and united to the yellow margin of the thorax. Scutellum shining black. Presutural bristle apparently absent, also hind marginal dorsal ones, but some longer, stiff yellow hairs there; notopleural bristles rather wider apart than usual; scutellum with three side marginal, the last one nearly apical; all the bristles black. *Abdomen* bright yellow, 2nd segment with a broad black band on posterior border, widest in the middle, where it extends nearly to

the apex of the short and very narrow 1st segment. A similar band on 3rd segment, rest of abdomen black. Venter yellow, with a few blackish marks. *Legs* wholly yellow, except the hind coxæ rather obscure, a broad dark brown band on hind femora leaving the knees narrowly pale, and hind tibiæ blackish-brown, with base and tips narrowly yellow. *Wings* very pale grey; a brownish very short stripe from tip of auxiliary vein to 2nd longitudinal vein, a second stripe from tip of 1st vein to (and indistinctly including) the upturned end of lower branch of 4th

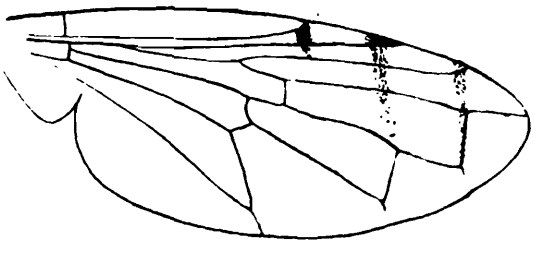

Fig. 30.—*Graptomyza tinctovittata*, Brun., wing.

vein, and a third stripe from tip of 2nd vein to, and including, the upturned end of upper branch of 4th vein; all these stripes being narrow and indistinct yet perfectly obvious. The closed anal cell very slightly infuscated at tip. Halteres brownish-yellow.

Length, 3 mm.

Described from one specimen in the Indian Museum, sex uncertain but probably ♀, from Sukna, base of Darjiling Hills, 500 ft., 1. vii. 1908 (*Annandale*).

112. **Graptomyza longirostris**, *Wied.*

Graptomyza longirostris, Wiedemann, Auss. Zweifl. ii, p. 208 (1830); Brunetti, Rec. Ind. Mus. ii, p. 63, fig. abd. normal; abd. var. 12-*notata*, mihi (1908); de Meijere, Tijd. v. Ent. li, p. 277 (1908).

♀ *Head* orange-yellow; frons and face of uniform width, being $\frac{1}{3}$ of head; frons black except at sides, with a little yellow pubescence; a black median stripe from base of antennæ, and a short one on each side of epistome, but none of them reaching tip of snout; this latter longer than height of eyes, proboscis nearly twice as long as snout, conspicuously bifid at tip; proboscis black. Antennæ brownish-orange, upper half of 3rd joint black; arista orange, plumose. *Thorax* orange-yellow; dorsum with a large black subquadrate spot filling greater part of surface, sometimes broadly reaching hind margin, with a short median black stripe in front joining the spot to anterior margin; the yellow of the side stripe runs narrowly along suture for a short distance on each side. Pleuræ about equally black and yellow, the area below humeri, and a very large triangular spot on mesopleura, yellow; the spot contiguous to base of wing and reaching posterior calli. Scutellum dull yellowish, a little

brownish in middle; three or more black supra-alar bristles, 1 postalar, 2 on posterior calli, 2 notopleural, and a row of long black bristles or bristly hairs along hind margin; similar bristles on hind margin of scutellum. *Abdomen* yellow; side margins narrowly black, and four longitudinal black stripes of about equal width, the median two rather closer together; all these stripes run from anterior margin of 2nd segment to tip of abdomen, and are unbroken in the typical form, but in the 12-*notata* variety

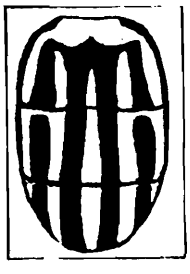

Fig. 31*a*.—*Graptomyza longirostris*, Wied., abdomen.

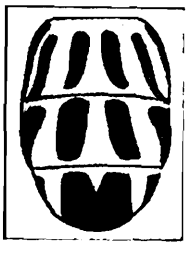

Fig. 31*b*.—*Graptomyza longirostris*, Wied., var. 12-*notata*, Brun., abdomen.

they are interrupted at margins of segments, thus forming twelve elongate spots placed longitudinally in four rows of three in each; varying considerably in individuals in the matter of width. *Legs* orange-yellow; femora and fore tibiæ broadly brown in middle; hind tibiæ almost wholly brown; tips of tarsi brown. *Wings* pale grey; stigma yellowish; wing-margin a little smoky from stigma to tip; outer side of 1st posterior cell narrowly suffused; halteres orange.

Length, 7–7½ mm.

Described from a typical example from the Tenasserim Valley (*Doherty*) and another from Batavia, x. 1907 (*Jacobson*); also from the *type*-specimen of my var. 12-*notata* from Sadiya, Assam, all in the Indian Museum. The species occurs in Sumatra, and the British Museum possesses a good series from Singapore (*Ridley*).

Described by Wiedemann from Westermann's collection, from Java.

113. **Graptomyza angustimarginata**, sp. nov. (Pl. III, fig. 19.)

♀ *Head*: frons and face of uniform width, between ⅓ and ¼ of head, with short yellow pubescence. Antennæ brown, upper part of the long 3rd joint black, arista black, brown at base, plumose. Epistome distinctly longer than height of eyes, brownish-yellow, a moderately wide median stripe and one on each side brownish-black. Occiput black, a pale yellow fringe on lower part. *Thorax* shining black; humeri, propleura and mesopleura, ends of suture and hind corners of dorsum, yellowish-brown. Pubescence of dorsum short, dense, yellow; some long yellow bristly hairs on hind margin. Scutellum brownish-yellow with a little yellow pubescence, centre black, hind margin with long

erect curved yellow bristly hairs; chætotaxy normal but weak, all bristles brownish-orange. *Abdomen* shining black, tinged with dark violet, finely punctate; middle of 1st segment, 2nd and 3rd segments towards sides rather broadly, 4th segment similarly but more narrowly, also hind margins of 2nd and 3rd segments narrowly, brownish-yellow. Actual side margins of dorsum rather broadly black, more or less curved underneath the venter. Whole dorsum with very short yellow pubescence, that of the yellowish venter sparser and longer. *Legs*: coxæ black with a little bright yellow hair; femora varying from yellowish to brownish, a little darker on apical half of fore pair, especially on under side. Front tarsi black; posterior tibiæ and tarsi brownish-yellow. Pubescence of legs yellow, with black hairs intermixed freely on front tibiæ and tarsi. *Wings* uniformly pale yellow; stigma uniformly a little deeper yellow; halteres brown.

Length, 9 mm.

Described from a unique (apparent) ♀ in the Indian Museum, from above Tura, Garo Hills, Assam, 3500–3900 ft., 15. vii.–30. viii. 1917 (*Kemp*).

Differing from *ventralis*, Wied., by the black coxæ, the black front metatarsus, the wholly yellowish middle legs, the more blackish hind femora and tibiæ, and the uniformly pale yellow wing with the stigma uniformly a little deeper yellow and not darker at its inner end.

114. **Graptomyza sexnotata**, *Brun.*

Graptomyza sexnotata, Brunetti, Rec. Ind. Mus. ii, p. 63, fig. abdomen (1908).

♀ *Head*: frons, vertex and face entirely yellow, eyes blackish-brown, with very short greyish pubescence; frontal space less than one-third the width of the head. Antennæ entirely uniformly dark yellow, with plumose orange arista. A dark brown square spot on frons above the antennæ is continued as a stripe below to the end of the rostrum; a broad brown stripe on each side of the epistome, which is barely as long as height of eyes. Proboscis brown; palpi pale yellow. Back and under side of head yellow, centre part apparently black. *Thorax* orange-yellow, the dorsum occupied by a shining black quadrate spot, which leaves only a yellow anterior margin, wider lateral margins and a squarish spot in front of the scutellum. A rather wide dark brown vertical stripe extends from between the fore and middle coxæ to the lateral yellow edge of the dorsum, thence curving backwards to just above and behind the root of the wing; a shorter similar stripe is immediately below the wing-insertion, with a roundish brown spot behind it. Dorsum nearly bare, a few yellow hairs on pleuræ; scutellum yellow, dorsum dark brown, indented; some yellow hairs round the margin: (most of the bristles are broken off, those that remain are yellow and apparently normally placed). *Abdomen* orange-yellow, with a

rather thick, moderately broad, lateral, dark brown margin, narrowing posteriorly and disappearing at tip. On the hind border of the 2nd segment two moderately large, dark brown triangular spots; reproduced on the 3rd segment, but a little larger, and with rounded angles; and again on the 4th segment, more triangular and of the same size as those on the 2nd segment, but placed quite clear of the hind border. Dorsum of abdomen practically bare, but with some short yellow hairs towards the tip. *Legs* yellow, fore coxæ with short pale yellow hairs; femora with a brown streak below; tibiæ pale yellowish-brown, the hind leg (one leg missing) showing the brown almost as a wide band; tarsi yellowish, brownish on upper side. Legs with short yellow hair, a little thicker on the tibiæ. *Wings* clear yellowish-grey, tip of subcostal cell tawny-brown, forming a not very well-defined stigma at the tip of the mediastinal vein. Halteres orange-yellow.

Length, $7\frac{1}{2}$ mm.

Described from one ♀ in fair condition in the Indian Museum collection, from Sikkim. Another ♀ in the British Museum from Dibra, Khasi Hills, 1878 (*Chennell*).

115. **Graptomyza ventralis**, *Wied.*, var. **nigripes**, *Brun.* (Pl. III, fig. 17.)

Graptomyza ventralis, Wiedemann, Auss. Zweifl. ii, p. 207 (1830).

♀. *Head*: frons and face with practically parallel sides, rather less than one-third of head; frons short, blackish, with short yellowish pubescence; face and snout dull yellowish, with a moderately broad median black stripe from base of antennæ and a similar stripe on each side from the eyes, all three stripes reaching tip of snout; latter about as long as height of eyes, with a little brown pubescence towards tip on upper side, and some short white hairs towards tip at sides and below. Antennal 3rd joint very elongate, orange, as is the plumose arista. Eyes with microscopical greyish pubescence; upper occipital margin with short whitish hairs, lower margin with white pubescence that grows shorter at sides, where it dies away. *Thorax* rather dark æneous with short, somewhat dense brownish-grey pubescence; humeri and a space below them, hind corners of dorsum narrowly and irregularly along hind margin, and a short vertical stripe on mesopleura, dull yellowish; chætotaxy normal. Scutellum dull yellowish; centre blackish; a row of long black bristles on hind margin, and also a row of stiff erect long yellow hairs there. *Abdomen* dull yellowish; base, except in centre, black; side margins narrowly to tip, a little more broadly in front, black. On hind margin of 2nd segment a large transverse spot, not reaching sides, rounded anteriorly and extending forwards beyond middle of segment; 3rd and 4th segments with a similar spot each, but leaving only a narrow yellow anterior margin to each segment,

and not reaching sides; both these spots narrowly bisected longitudinally by a pale space. Pubescence of dorsum mainly following ground-colour, but whitish or pale yellowish at sides, and over all the 4th segment and the nearly all yellowish venter. *Legs* orange-yellow; apical half of anterior femora, apical three-fourths of hind pair, and nearly the whole of all the tibiæ, black; all knees narrowly pale; all tarsi brownish-yellow, tips darker, especially in the fore pair. Pubescence of legs whitish but black on hind tarsi. *Wings* pale yellowish-grey; stigma ill-defined but moderately dark brown, the subcostal cell thence to its tip yellow; a small brown elongate ill-defined spot over tip of 1st basal cell.

Length, about 7½ mm.

Described from 3 ♀ ♀ in Indian Museum. Kasauli, 29. vi. 1905 (*Barrow*); Kurseong, 5000 ft., 3. vii. 1908 (*Annandale*); Sadiya, Assam, 27 xi. 1911 (*type* of *nigripes*) (*Kemp*); other examples from Kurseong, 5000 ft. (*Annandale*); Gangtok, Sikkim, 6150 ft., 9. ix. 1909; above Tura, Garo Hills, Assam, 3500–3900 ft., 15. vii.–30. viii. 1917 (*Kemp*).

In the typical form of *ventralis* the yellow colour of the face is carried narrowly along the eye-margins of the frons to the vertex; the sides of the thoracic dorsum are narrowly yellow and there is considerably more yellow on the pleuræ. The pubescence towards the hind margin of the dorsum is yellow, and the bristles there all yellow. The femora are mainly orange, but tinged indefinitely with brown on the apical half; the hind tibiæ have whitish, not black, pubescence, and all the tarsi have more orange in them than in the variety *nigripes*.

Differing from *angustimarginata*, Brun., by the yellow coxæ, the almost wholly black front tibiæ and yellowish fore metatarsi, the broadly black ringed middle femora and nearly wholly black middle tarsi, the larger amount of black in the hind legs, and the pale grey basal part of the wing, with the inner end of the stigma conspicuously black.

Only one specimen of the typical form has been seen by me: a ♀ from Rotung, Abor Expedition, 1400 ft., 26. xii. 1911 (*Kemp*). The species was originally described from Java, and De Meijere records it from Buitenzorg. The coloration of the legs and of the chætotaxic bristles appears to be distinctly variable.

Genus **VOLUCELLA**, *Geoffr.**

Volucella, Geoffroy, Hist. d'Ins. envir. d. Paris, ii, p. 540 (1764).
Cenogaster, Duméril, Zool. Anal. p. 282, Expos. etc. (1801).
Pterocera, Meigen in Illiger, Illig. Mag. ii, p. 275 (1803).
Ornidia, St. Fargeau et Serville, Encycl. Méthod. x, p. 786 (1825).
Temnocera, id., l. c. cit.
Atemnocera, Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. cxiv (1882).
Camerania, Giglio-Tos, Boll. Mus. Zool. e Anat. comp. Torino, vii, No. 117, p. 3 (1892).

* For a table of the Oriental species, see Brunetti, Rec. Ind. Mus. ii, p. 60 (1908)

GENOTYPE, *Musca pellucens*, L.; by designation of Curtis, 1833.

Head as broad as thorax or a little narrower; frons but little produced; eyes pubescent in ♂ at least on upper part, bare in ♀ *, contiguous in ♂ for a considerable space; face barely hollowed under antennæ, but produced abruptly into a very large central bump, below which a slight excavation may appear above the still more produced upper mouth-border. Antennæ moderately long, 3rd joint elongate, arista nearly basal, very plumose. *Thorax* quadrate, with long and dense pubescence (like that of

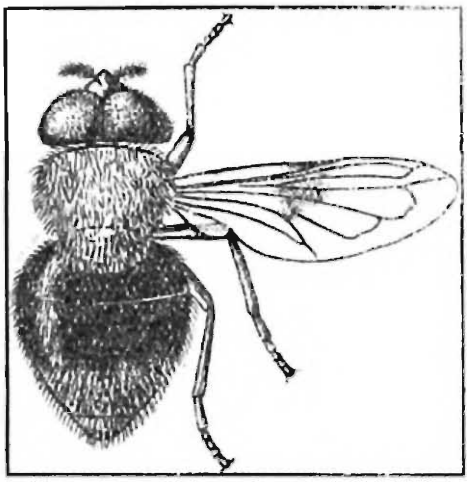

Fig. 32.—*Volucella ruficauda*, Brun., ♂.

Bombus) or with dense short inconspicuous pubescence; some strong black bristles above base of wing, on post-alar calli and back of mesopleura, along sides of thorax and round margin of scutellum. *Abdomen* short-ovate, broader than thorax, with pubescence like that of the thorax. *Legs* simple. *Wings* with a characteristic venation; marginal cell closed, anterior cross-vein distinctly before middle of discal cell, apical portion of 4th vein strongly recurrent; 2nd vein bristly at base.

Life-history. The larvæ live in bees' and hornets' nests, where they devour not the living hymenopterous larvæ as was at first supposed, but the dead larvæ and pupæ. Thus they are scavengers, and their presence in the hives is not resented.

Range. The world, except Australia.

An exceedingly well-marked genus, many of the species showing great resemblance to humble-bees, wasps and hornets.

Verrall makes the very interesting statement that of one of the commonest British species, *V. bombylans*, L., about 60 per cent. of the specimens mimic the common bee *Bombus terrestris*, and about 38 per cent. mimic *B. lapidarius*, while the remaining 2 per cent. may have the colour-scheme of almost any species of *Bombus*; the various forms pair promiscuously.

* Except in one European species, *V. inflata*, Fabr., and possibly certain others.

Table of Species.

1.	Bare species; any pubescence present very short, even if dense.. ..	2.
	Densely pubescent species, pubescence long and conspicuous	6.
2.	Abdomen mainly orange, with black marks	*signata*, sp. n., p. 146.
	Abdomen mainly or wholly black	3.
3.	Thorax tawny or orange .	4.
	Thorax black	5.
4.	Abdomen with two narrow pale cross-bands; wings suffused in centre and at tip	*trifasciata*, Wied., p. 147.
	Abdomen entirely black; wings pale brown, unmarked	*discolor*, Brun., p. 149.
5.	Second abdominal segment wholly yellow; scutellum bright tawny . .	*pellucens*, L., p. 150.
	Second abdominal segment with basal half only yellowish: scutellum nearly black	*basalis*, Brun., p. 150.
6.	Tip of abdomen black-haired	*ursina*, de Meij., p. 151.
	Tip of abdomen orange- or yellow-haired	7.
7.	Venter uniformly black. .	*ruficauda*, Brun., p. 152.
	Venter with 2nd and 3rd segments livid.	*lividiventris*, Brun., p. 152.

Volucella opalina, Wiedemann (Auss. Zweifl. ii, p. 203, 1830) must be totally deleted from the list of Asiatic Diptera. It was erroneously recorded by Wiedemann from "Bengal," a mistake which was unfortunately repeated by Bigot in 1883 (Ann. Soc. Ent. France, (6) iii, p. 68) and by Van der Wulp in 1896 (Cat. Dipt. S. Asia, p. 116). Princess Theresa of Bavaria has, however, called attention (Berlin. Ent. Zeitschr. xlvii, p. 245, 1902) to the fact that the type really came from Brazil, and further specimens have subsequently been collected in S. America. The locality is correctly given by Kertész, Cat. Dipt. vii, p. 197, 1910.

116. **Volucella signata**, sp. nov.

♂ *Head* set very closely on thorax. Eyes closely contiguous for about half the space between vextex and base of antennæ, with dense short brownish-yellow pubescence on upper half; facets gradually diminishing in size from in front hindwards. Head wholly orange; vertex very small, with long hairs, black and yellow mixed; ocelli ruby-red. Frontal triangle rather small, with short yellow hairs. Antennæ and aristæ wholly orange. Face rather deeply cut away below antennæ. The whole epistome obtusely produced, bearing short yellow pubescence with which some short black hairs are intermixed over central bump; the latter is of moderate size. A rather faint, brownish, narrow streak on cheeks from lower corners of eyes to tip of epistome. Occiput yellowish-grey, not extending beyond level of eyes, the upper margin nearly bare, but with yellowish-grey pubescence about the middle,

gradually lengthening on under side. *Thorax* brownish-orange; a fairly obvious, pale yellowish, median stripe from anterior margin, reaching (seen from behind) about to middle of dorsum; humeri, more yellowish. Hinder part of dorsum and under side of thorax darker brown, the colour softly blended with that of the paler dorsum. Pubescence of dorsum and pleuræ bright golden-yellow on the orange parts and blackish-brown on the brown parts. Some stiff black hairs and moderately long black bristles on hinder half of side margins of dorsum. Scutellum orange, with golden-yellow pubescence with some black hairs intermixed on hinder part, and a row of about twelve long black bristles on hind margin. *Abdomen* bluntly conical, as long as thorax; bright orange with a slight brown tinge; 1st segment and base of 2nd narrowly livid grey; rest of 2nd segment soft dull blackish-brown; 3rd segment with a large triangular spot in centre, the apex barely touching anterior margin; the other angles drawn out to sides of segment, which they attain; base of triangle quite clear of hind margin; 4th segment a little tinged with brown towards tip. Genitalia orange. Whole pubescence of abdomen microscopic, dense, orange, except on the livid base and anterior corners, where it is greyish and rather longer. Venter blackish; hind margins of 2nd, 3rd and 4th segments narrowly pale yellow, well-defined. *Legs* orange, with short orange pubescence; coxæ and about basal half of femora black, with black pubescence; hind tibiæ and tarsi more yellowish, with dense pale yellow pubescence. *Wings* yellowish-grey; anterior part deeper yellow; stigma obvious, blackish, elongate; halteres pale yellow.

Length, 15 mm.

Described from one ♂ (*type*) in the Indian Museum, from above Tura, Garo Hills, Assam, 3500–3900 ft., ix. 1917 (*Mrs. Kemp*): a second ♂ in the British Museum from the Khasi Hills. Very distinct from all other Indian species.

117. Volucella trifasciata, *Wied.*

Volucella trifasciata, Wiedemann, Auss. Zweifl. ii, p. 196 (1830).
Volucella linearis, Walker, Ins. Saund. Dipt. i, p. 251 (1852).
Volucella decorata, id., Proc. Linn. Soc. Lond. iv, p. 120 (1860).
Volucella nubeculosa, Bigot, Ann. Soc. Ent France, (5) v, p. 474 (1875); (6) iii, p. 77 (1883).

♂ ♀ *Head* yellowish-orange to dull yellowish; vertical triangle in ♂ extremely small, black, with some brown hairs and brownish-yellow ocelli; frons in ♂ small, somewhat projecting, dull yellowish with yellow pubescence. Antennæ orange, arista orange with black hairs. Face deeply cut away below antennæ, where it is pale yellowish, rest dull yellowish with short bristly pubescence: mouth-border and proboscis orange-yellowish. In ♀, frons barely wider above antennæ than at vertex, orange-yellow, very smooth and shining, with short soft pale yellow pubescence. In

individuals of both sexes occur traces of a blackish stripe from eye-margins to mouth-border; postocular fringe yellow, inconspicuous. Occiput dusted with yellowish-grey. *Thorax* and scutellum entirely orange; former with wholly yellow pubescence to the normal extent, and a row of yellow bristles on hind margin; latter sometimes with hardly any pubescence other than the long up-curved stiff hairs on hind margin; dorsum of thorax appearing tinged with brown when viewed from in front; at least three black or orange, brown-tipped spines on humeri, also two above and a little in front of wing-base, two on upper part of mesopleura, three on posterior calli, generally all orange; long yellow stiff hairs on hind margin of dorsum; soft yellow hair on pleuræ. *Abdomen* black, base of 1st segment yellowish, as are two narrow, linear bands, slightly arcuate in front, the first rather wider than the second, lying over the margins of the 2nd and 3rd, and of the 3rd and 4th, segments; venter very similar. Pubescence of abdomen short, golden-yellow, invisible when viewed from behind, but conspicuous when seen from in front. *Legs* orange; hind femora sometimes with a broad sub-basal or median blackish band; they and the posterior tibiæ are generally a little brownish; tarsi generally darker towards tips. *Wings* yellowish-grey; a small brown narrow cloud from middle of anterior margin, along the cross-veins, dying away towards anal cell; wing-tip smoky-brown; halteres orange.

Length, 14–16 mm.

Type in Leyden Museum (*teste* Wiedemann).

Redescribed from a single ♂ (*decorata*, Walk.) and nine ♀ ♀ in various collections. The identity of the species given here as synonymous is certain, the *types* of *decorata*, *linearis*, and *nubeculosa* being before me (in the British Museum).

The type of *decorata*, Walk., from Celebes is in fairly good condition and is the only ♂ I have seen. It has the thoracic dorsum blackish with deep blue reflections, leaving only moderately narrow side margins, the pale colour extending inwards at the end of the suture. The hind femora have a broad median brownish band, the hind tibiæ are brownish on the apical half, and all the tarsi are a little darker than in the more normal form.

Of *linearis*, Walk., a species described without record of locality, only the type, in wretched condition, is present, labelled as from India. The head has been stuck on, and may not belong to the body, judging by the frons, which widens rapidly from vertex to antennæ (whereas in the normal form it is barely wider below than above). The wings are much darker brown anteriorly, making the dark patch in the middle of the costa less obvious; the costal patch is of the usual dull orange colour; the abdomen is all black, except for being rather narrowly pale at base of 1st segment and barely appreciably so on hind margin of 2nd. Legs orange to tips of tarsi (the tarsus of the one hind leg remaining is missing).

V. nubeculosa, Big., differs in no way from *trifasciata*, except that the pale parts of the abdomen are reduced to two narrow bands lying across the emarginations of the 2nd and 3rd, and of the 3rd and 4th segments, very slightly arcuate on front side, practically linear, the first band slightly wider than the 2nd. The pale bands (regarded as such) in *trifasciata* are merely much broader, but are similarly shaped and placed.

Individuals of *V. trifasciata* vary in the thoracic dorsum being tinged with blue-black, which is sometimes confined to the hinder half (as is the case in two ♀ ♀ in the British Museum from Assam, which also possess a bluish-black frons); in the hind femora, which are normally entirely orange, but which sometimes have a more or less basal broad black band; and in the intensity and extent of the wing-markings.

"India" (type of *linearis*); Sikkim; South Shan States, Upper Burma, 4000 ft., xi. 1899 (*Lieut.-Col. Bingham*); Lower Ranges, Khasi Hills, Assam, 1878 (*Chennell*); Bukit Kutu, Selangor, Federated Malay States, 3500 ft. (*Robinson*); Kelantan, Fed. Malay States (a ♀ variety, with frons and nearly all the surface of thorax, scutellum and abdomen shining black); Celebes (type of *decorata*); China (type of *nubeculosa*). Originally described by Wiedemann from Java; also recorded from Borneo.

118. **Volucella discolor**, *Brun.*

Volucella discolor, Brunetti, Rec. Ind. Mus. ii, p. 62 (1908); de Meijere, Tijd. v. Ent. li, p. 276 (1908).

♂ *Head*: eyes not quite contiguous, black, facets small, uniform. Vertex, frons and entire face bright orange, bare. Face immediately below antennæ flush with the eyes, but from thence projecting well forward, forming a large squarish prominence, not reaching downwards much below the eye-level. Antennæ on a barely perceptible prominence, orange, with orange plumose arista. Back and under side of head orange, a little orange-yellow hair below. *Thorax* wholly uniformly bright orange, with close short golden-yellow hair on dorsum, changing to longer orange hair on the edge, on the posterior part and on the pleuræ. Scutellum pinkish-orange, a little yellow hair round the sides. *Abdomen*: 1st segment (hardly visible) dark coloured, remainder wholly shining black, with microscopic black pubescence. On each extreme anterior corner is a small bunch of rather short yellow hairs. Venter black, unmarked. *Legs* wholly bright orange, with short golden-yellow hair, which is a little longer on the coxæ. The tarsi very narrowly black between the joints. *Wings* uniformly pale brown, outer half towards the anterior margin a little darker; halteres bright orange.

Length, 10 mm.

Described from one perfect ♂ from Sibsagar in the Indian

Museum collection. Dr. de Meijere records a ♂ from Japan agreeing almost exactly with my description.

119. Volucella pellucens, *L.*

Musca pellucens, Linnæus, Syst. Nat. Ed. x, p. 595 (1758).
Volucella pellucens, Verrall, Brit. Flies, Syrph. p. 490: auctt. var.
Conops dryaphilus, Scopoli, Ent. Carn. p. 353 (1763).
Musca fera, Harris, Expos. Engl. Ins. p. 39, pl. x, fig. 2 (1782).
Syrphus putescens, Schellenberg, Gen. Mouch. pl. viii, fig. 2 (1803).

♂ ♀ *Head* brownish-yellow; frons but little produced, a little more brownish, with a little short black pubescence; vertex black. Eyes with dense black pubescence in ♂, bare in ♀ Antennæ dull orange, arista orange, pubescent practically to tip. Frons in ♀ with nearly parallel sides. *Thorax* shining black, brownish on humeri and for some distance along sides; pubescence short, blackish; some black bristles at base of pleuræ, above base of wing, on posterior calli and margin of scutellum. *Abdomen* short-ovate, shining black, with brown and bluish reflections; 2nd segment all yellowish-white except a narrow brownish median stripe, broadened at base, sometimes absent in ♀ Pubescence of abdomen very short though dense, following ground-colour, except along hind margin of 2nd segment, where it is black. *Legs* black, knees a little brownish-orange; base of anterior tarsi more so; pubescence very short, black. *Wings* pale orange on about basal half; a distinct blackish cloud across middle and at tip, the intermediate space darker, these darker marks fading gradually hindwards to the entirely clear hind margin. Squamæ blackish-brown with orange margins and fringe; halteres dull brown.

Length, about 15 mm.

The above is mainly abridged from Verrall's description of British specimens.

One ♂ in the Forest Zoologist's collection from Takula, Kumaon District, W Himalayas. Distributed over all Europe and recorded from Japan.

120. Volucella basalis, *Brun.*

Volucella basalis, Brunetti, Rec. Ind. Mus. ii, p. 61 (1908); i, pl. xi, fig. 11, abd., fig. 12, wing (1907).

♀. *Head* entirely bright orange; frons narrowing towards vertex, which is black; mouth-border brown; proboscis and extreme lower part of cheeks black; eyes bare. The face is considerably produced into a large snout, which is cut away just below the antennæ; antennæ small, orange. *Thorax* moderately shining black, bare, sides black; scutellum very dark brown, almost bare, except for a row of strong bristles near posterior edge. *Abdomen* black, a little shining, almost bare; the basal half of the 2nd segment occupied by a large transverse livid yellow elongated

spot, which is contracted in the middle behind and does not reach the sides of the segment except at the extreme base, where it joins a large livid spot on the same segment of the venter. *Legs* all black and bare. *Wings* grey, yellow at base, a yellowish-brown suffusion from the centre of the costa reaching half-way to the posterior border, and a similar suffusion at the wing-tip extending inwards just beyond the subapical and postical cross-veins; halteres yellow.

Length, 16 mm.

Described from one ♀ in the Indian Museum collection, from Mungphu, Sikkim District.

This species bears a considerable general resemblance to *V. pellucens*, L., of Europe, but in that species the *whole* of the 2nd segment is livid yellow, this colour passing over the sides of the segment in its full width, whereas in *basalis* it is narrowed to the extreme base of the segment; also in *pellucens* the sides of the thorax along their upper edge are always brownish-yellow, of which there is no trace in *basalis*; moreover, the scutellum in *pellucens* is bright tawny, whereas in *basalis* it is nearly black.

121. Volucella ursina, *de Meij.*

Volucella ursina, de Meijere, Bijd. Dierk. xviii, p. 101 (1904).

♀ *Head* shining black; epistome also black, except for a yellow side stripe contiguous to eyes, reaching nearly to tip of epistome; mouth-border narrowly yellowish. Frons with black pubescence. Antennal 1st and 2nd joints reddish-yellow, the kidney-shaped 3rd joint yellowish-brown. *Thorax* yellowish-brown, dorsum rather darker, with rather long and dense yellowish-brown pubescence. Scutellum honey-yellow. *Abdomen* blackish-brown, only the very short 1st segment yellow, with short though dense yellow and black pubescence; on 2nd segment yellow pubescence predominates, particularly near the hind border, on the 3rd segment black; on this latter only a narrow cross-band, shaped like an inverted **V**, and the hind border are yellow-haired; 4th segment nearly all black-haired, only in front and at sides with a little yellow pubescence. Venter shining black. *Legs* black; coxæ yellow, as are also the front and middle femora, with the exception of a clear-cut black longitudinal stripe on the apical half on inner side; all knees yellow. *Wings* at tip rather darker; with a blackish spot in middle of anterior margin which extends rather far towards the base, but leaves the submarginal cell free, and does not extend behind over the 4th vein or distally over the anterior cross-vein.

Length, 17 mm., of wing 16 mm.

Darjiling, 1 ♀. Very like *trifasciata*, Wied., but of a different colour. Also resembling *jeddona*, Big.

122. Volucella ruficauda, *Brun.*

Volucella ruficauda, Brunetti, Rec. Ind. Mus. ii, p. 61 (1908); i, pl. xi, fig. 13, wing (1907).

♂ ♀ *Head* black; epistome well produced, shining black; eyes densely hairy in ♂, distinctly hairy, but to a much less extent, in ♀; vertex crowned by a tuft of long bright yellow hairs; eyes in ♀ separated by the narrow shining black frons. Antennæ ferruginous; first two joints nearly black. *Thorax* black with black hair, dorsum covered with dense long bright ferruginous-red hair which also covers the bright ferruginous-red scutellum. *Abdomen* black with rather thick black hair; posterior border of 3rd segment and the whole of the 4th and 5th segments covered with yellowish-red hair. Venter entirely black with black hair. *Legs* slender, wholly black with short black hair. *Wings* pale yellowish-grey, a rather large brown irregular spot in the centre of the fore border, and reaching half-way across the wing; a brown suffusion along the recurrent portions of the subapical and postical (4th and 5th longitudinal) veins and extending to the costa about the termination of the marginal cell. Between this suffusion and the outer margin the wing is darker grey; base of wing slightly yellowish; halteres black.

Length, 14–15 mm.

Described from eight ♂ ♂ and eight ♀ ♀ in the Indian Museum collection from Sikkim.

123. Volucella lividiventris, *Brun.*

Volucella lividiventris, Brunetti, Rec. Ind. Mus. ii, p. 62 (1908).

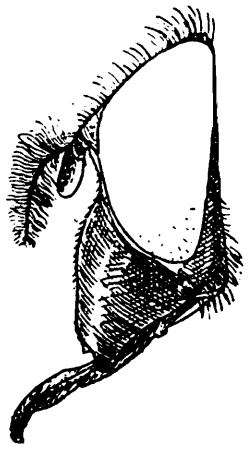

Fig. 33.—*Volucella lividiventris*, Brun., head in profile.

♂ ♀. Very near *ruficauda*, but distinct. The hair on the thoracic dorsum is distinctly grey, the tuft of hair on the vertex is greyish-white, while the venter has the 2nd and 3rd segments livid grey with unicolorous hair. A bunch of grey hair is found on each of the two basal abdominal segments at the sides, and the

sides of the 2nd segment in front have a perceptible subdued livid reflection when seen from behind.

Length, 15–16 mm.

Described from three ♂ ♂ and a ♀ from Sikkim in the Indian Museum collection.

Genus **ENDOIASIMYIA**, *Big.*

Endoiasimyia, Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. cxxxvi (1882); and (6) iii, p. 229 (1883).

GENOTYPE, *E. indiana*, Big.; by original designation.

Entirely like *Chilosia* in facies, differing practically only in the arista, which is conspicuously plumose on both upper and under sides from base to tip, and in the absence of eye-margins. The eyes are pubescent, the face strongly produced into a central bump and again above the mouth-opening. Venation as in *Chilosia*; tip of 4th vein just appreciably recurrent at extreme tip.

The whole affinities of this genus appear to be with the SYRPHINÆ, except for the plumose arista; but as the latter character is entirely foreign to that subfamily, it is not suggested to place this genus there. On the other hand, it is quite incongruous as a Volucelline.

124. **Endoiasimyia indiana**, *Big.*

Endoiasimyia indiana, Bigot, Ann. Soc. Ent. France, (6) iii, p. 229, ♀ (1883).

♀. *Head*: eyes with short whitish pubescence; frons at vertex nearly one-fifth of the head, rapidly widening to antennæ, shining black, with brownish-yellow pubescence and some greyish dust towards sides; face produced into a large and conspicuous central bump and again produced above mouth-opening; shining black, with whitish pubescence and a little yellowish-grey dust in places and on extreme side margins. Antennæ as in *Chilosia*, except that the arista is strongly plumose on upper and lower sides from base to tip. Head produced in profile distinctly but not greatly below eyes; occiput barely projecting behind eye-margins, grey-dusted, with a short fringe on at least lower part. *Thorax* slightly shining black, with some brownish pubescence on dorsum and pleuræ; scutellum rather long, concolorous, a little yellow pubescence dependent from hind margin. *Abdomen* like that of *Chilosia*, obconical, of five obvious segments, 1st nearly as long as 2nd; moderately shining black, with short reddish-brown pubescence. *Legs* slender like those of *Chilosia*; coxæ black, femora also black, but narrowly orange-brown at tips; tibiæ orange-brown, with a median black ring; tarsi brownish, middle pair yellowish. *Wings* brownish-grey, a little darker apically nearly as far inwards as middle of discal cell; marginal cell widely

open; anterior cross-vein at one-third of discal cell; 3rd vein nearly straight. Whole venation like that of *Chilosia*, though the tip of the 4th vein is just appreciably recurrent; halteres dull yellowish.

Length, 11 mm.

India: redescribed from the unique *type* in the Bigot collection, which is in inferior condition but has the generic and specific characters sufficiently obvious.

Subfamily ERISTALINÆ.

Antennæ moderately long, pendent, arista dorsal, bare to plumose. Wings with anterior cross-vein at or beyond middle of discal cell; 3rd vein with a distinct downward loop into 1st posterior cell; marginal cell generally open except in *Eristalis* (*s. lat.*). Hind femora usually thickened and often with a distinct subapical dilatation or with a tooth-like process.

This subfamily is of world-wide distribution, the two principal genera *Eristalis* and *Helophilus* (one or the other, generally both) having representatives in every quarter of the globe; but in several of the genera the species are very closely allied, and moreover often subject to considerable variation, which makes a keen study of allied species a *sine qua non* for their certain identification. Even the European species of one of the largest genera, *Merodon*, are but imperfectly understood.

The life-histories of some forms have been unravelled; the larvæ, except those of *Merodon*, are usually of the "rat-tailed" type, as in the common *Eristalis tenax*. In some species the apical prominence in the larva forms a flexible tube capable of extension to several times the length of the body. Many species are excellent hoverers and nearly all are of general distribution, preferring sunshine, open spaces in woods, flowering or sweet-smelling plants and bushes. One or two species of *Helophilus* extend to the Arctic regions.

Table of Genera.

1.	Marginal cell closed .	2.
	Marginal cell open...	5.
2.	Hind femora toothed. ..	PRIOMERUS, Macq., p. 155.
	Hind femora not toothed* ...	3.
3.	Thorax broader than long; scutellum abnormally wide; a wrinkled space on frons above antennæ.. .. .	MEGASPIS, Macq., p. 196.
	Thorax quadrate; scutellum of normal shape; no wrinkled space on frons ..	4.
4.	Anal vein elongate, tip recurrent (much as in *Milesia*); loop of 3rd vein diagonally placed	KORINCHIA, Edw., p. 224.
	Anal vein not elongate, often barely reaching margin of wing; loop of 3rd vein normal	ERISTALIS, Latr., p. 155.

* Except in *Megaspis crassus*, Fabr.

5. Hind femora toothed below ...	MERODON, Meig., p. 211.
Hind femora thickened or not; without any prominent tooth or spine below .	6.
6. Anterior cross-vein much beyond middle of discal cell.	AZPEYTIA, Walk., p. 221.
Anterior cross-vein almost exactly at middle of discal cell	7.
7. Body subfusiform (*i. e.*, head, thorax and abdomen closely applied to one another); brilliant metallic blue or violet species, apparently bare though actually very shortly pubescent ...	AXONA, Walk., p. 222.
Body not subfusiform; non-metallic species	8.
8. Densely pubescent species	MALLOTA, Meig., p. 218.
Bare species	HELOPHILUS, Meig., p. 204.

Genus **PRIOMERUS**, *Macq.*

Priomerus, Macquart, Hist. Nat. Ins., Dipt. i, p. 511 (1834).

GENOTYPE, *P. fasciatus*, Macq., the original species.

"Face prominent, a little concave below antennæ; epistome thick, descending some distance below eyes in profile. Eyes contiguous in ♂ Antennæ on a frontal projection, 3rd joint oval, arista bare, dorsal. Abdomen depressed. Hind femora denticulate. Marginal cell closed."

Macquart attributes this genus to Serville, stating that it has the facies of *Helophilus*. Kertész (Cat. Dipt. vii, p. 208, 1910) sinks *Priomerus* in *Eristalis*, but in my opinion the toothed hind femora entitle it to rank as distinct.

125. **Priomerus fasciatus**, *Macq.*

Priomerus fasciatus, Macquart, op. cit. p. 512 (1834).

♂ "Black. Face and front with grey tomentum; facial bump black; antennæ tawny, brown above. Thorax with green reflections and three yellow longitudinal stripes; sides yellow. Hind border of scutellum tawny. Second abdominal segment with a broad yellow band, interrupted in middle, 3rd and 4th segments each with a straight whitish band. Base of tibiæ whitish.

"India. Serville's collection."

Van der Wulp quotes the locality as East India. The species may be taken as requiring confirmation as Indian.

Genus **ERISTALIS**, *Latr.*

Eristalis, Latreille, Hist. Nat. Crust. Ins. xiv, p. 363 (1804).
Palpada, Macquart, Hist. Nat. Ins., Dipt. i, p. 512 (1834).
Syrphus, Zetterstedt (*nec* Fabr.), Ins. Lapp., Dipt. p. 591 (1838).
Eristalinus, Rondani, Nuov. Annal. Sci. Nat. Bologna, (2) ii, p. 453 (1844).
Eristaloides, id., loc. cit.

Dolichomerus, Macquart, Dipt. Exot., Suppl. 4, p. 131 (1849).
Eristalomyia, Rondani, Dipt. Ital. Prodr. ii, p. 38, nota (*Eristalomya*) (1857).
**Simoides*, Loew, Öfvers. Kongl. Vet.-Akad. Förhandl. xiv (1857), p. 382 (1858).
Eriops, Lioy, Atti. Isti. Veneto, (3) ix, p. 743 (1864).
Doliosyrphus, Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. cxx (1882).
Dolyosyrphus. id., op. cit., (6) iii, p. 228 (1883).
Eristalodes, Mik, Wien. Ent. Zeit. xvi, p. 114 (1897).
Lathyrophthalmus, id., loc. cit.

GENOTYPE, *Musca tenax*, L.; by Curtis's designation (Brit. Ent. 1832).

Head as broad as, or a little broader than, thorax, approximately semicircular; frons only slightly produced, always pubescent; eyes contiguous in ♂ (exceptions rare), wide apart in ♀, pubescent (in some species on upper part only); face with distinct central knob and moderately produced upper mouth-edge; antennæ normal, 3rd joint oval, with arista dorsal, either quite bare or

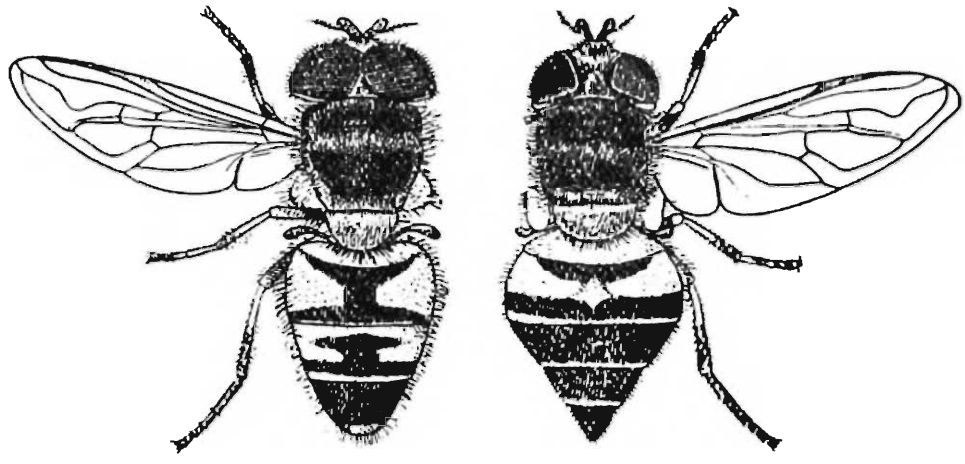

Fig. 34.—*Eristalis solitus*, Walk., ♂ (left), ♀ (right).

plumose on basal half. *Thorax* quadrate, densely but often inconspicuously pubescent; scutellum similarly clothed, frequently yellowish or translucent. *Abdomen* about as wide as thorax, ovate, subconical or rather elongate, generally with pale (usually yellowish) markings, side spots or bands; pubescence of great variability. *Legs* simple, pubescence very variable, hind femora normally not incrassate; hind tibiæ usually, but frequently only slightly, curved. *Wings* of normal venation except that the marginal cell is closed. The 3rd vein takes a very conspicuous downward loop into the 1st posterior cell, which is closed well or just before the border by the upward-curved tip of the 4th vein.

Life-history. That of the cosmopolitan *E. tenax* is known. It breeds in drains, the larvæ of this genus being known as "rat-tailed

* Considered a valid genus by some authors.

maggots." *E. arbustorum*, L., has been found in the larval stage in puddles of dirty water *.

Range. World-wide.

A very large number of species are known, and the adults may occur pratically in almost every conceivable habitat. They are splendid hoverers, and may be taken in numbers on all sweet-smelling flowers in the sunshine; they have a very powerful and rapid flight, often with a loud hum like that of a bee.

De Meijere gives an excellent table of the species known to him †, and notes on various Oriental species were collated by me ‡. Osten-Sacken also has contributed several papers on the ancient history of *E. tenax*.

Table of Species.

1.	Arista plumose (at least on basal half) ..	2.
	Arista bare (or at most microscopically plumose at base).	12.
2.	Eyes bare	3.
	Eyes distinctly pubescent (sometimes not wholly so)	4.
3.	Thorax grey-tomentose from anterior margin to suture; abdominal 3rd and 4th segments with metallic-green hind margins and yellow markings; basal half only of anterior tibiæ yellow (hind legs missing)	*latus*, Macq., p. 192.
	Thorax with a narrow grey band immediately in front of suture; abdominal 3rd and 4th segments without yellow markings, front and hind margins æneous; anterior tibiæ and basal half of hind pair yellow	*suturalis*, sp. n., p. 193.
4.	Hind tibiæ so curved as to appear broken.	*curvipes*, Sch., p. 192.
	Hind tibiæ without such appearance	5.
5.	Abdomen all black; at most 1st segment more or less pale, or extreme hind margins of segments yellow or whitish ..	6.
	Abdomen never all black; definite yellowish spots of some size always present, generally more or less like those of *E. tenax*	7.
6.	Wings with a large brown suffusion in middle .	*himalayensis*, Brun., [p. 168.
	Wings clear .. .	*albibasis*, Big., p. 169.
7.	Basal half of hind femora orange.. .	*basifemoratus*, sp. n., [p. 175.
	Hind femora wholly black, or tips only pale	8.
8.	Considerably pubescent species, somewhat like *E. intricarius*. Basal pubescence of abdomen dense, yellow, apical pubescence red.	*intricarioides*, sp. n., [p. 171.
	Comparatively bare species, never like *intricarius*, generally more or less like *tenax*	9.

* See note in Appendix. † Tijd. v. Ent. li, p. 242 (1908).

‡ Rec. Ind. Mus. xi, p. 228 (1915).

9. A cross-band of greyish pubescence on thorax ... . 10.
Thorax without such cross-band .. .. 11.
10. Spots on 3rd abdominal segment in ♂ triangular or oblong, placed *on* the anterior margin and reaching side margins; in ♀, spots smaller and narrower, but always on anterior margin. *solitus*, Walk., p. 172.
Spots on 3rd abdominal segment (♂ ♀) narrower, linear, not reaching side margins, placed transversely over *centre* of segment . ... [p. 176. *angustimarginalis*, sp. n.,
11 Epistome conspicuously and conically produced .. .. *simulatus*, sp. n., p. 177.
Epistome only moderately produced *arbustorum*, L., p. 179.
12. Eyes striped . . .. 13.
Eyes never striped; either spotted, irregularly marked or unicolorous ... 14.
13. Thorax yellow, with 4 conspicuous black stripes; 3rd abdominal segment mainly or wholly black . .. . *quinquelineatus*, F., var. [*orientalis*, n., p. 183.
Thorax dull yellowish-grey, with 4 indistinct black stripes; 3rd abdominal segment mainly yellowish . . . *tæniops*, Wied., p. 186.
14. Eyes spotted, or with irregular dark markings 15.
Eyes unicolorous ... . 23.
15. Eyes in ♂ contiguous (presumably so in *tabanoides*, in which ♂ is unknown) .. 16.
Eyes in ♂ comparatively widely separated. *sepulchralis*, L., p. 161.
16. Obviously black or æneous species .. 17.
Black and yellow species (black and grey in *tabanoides*) . .. 19.
17. Abdomen uniformly æneous, without spots. *taphicus*, Wied., p. 162.
Abdomen with grey or whitish spots 18.
18. Abdominal spots obliquely placed . *obliquus*, Wied., p. 164.
Abdominal spots transversely placed *lætus*, Wied., p. 165.
19. Second, 3rd and 4th abdominal segments all orange except for a clear-cut posterior margin and a median stripe; no arcuate whitish bands present . [p. 180. *polychromatus*, sp. n.,
Second, 3rd and 4th segments never all orange, the markings never rectangular; arcuate whitish bands normally present 20.
20. Femora normally all orange or brownish-orange . . .. *arvorum*, Fabr., p. 181.
Femora black; tip generally more or less pale . ... : .... . 21.
21. Thorax and abdomen yellow and black .. 22.
Thorax and abdomen whitish-grey, with black stripes and bands, practically no yellow present. ... . [p. 189. *tabanoides*, Jaenn.,
22. Tarsi yellowish-white nearly to tips; abdomen comparatively shorter, more ovate-conical . . .. [p. 187. *quinquestriatus*, Fabr.,
Tarsi black, at most pale at base; abdomen comparatively longer and narrower, more elongate-conical [p. 190. *obscuritarsis*, de Meij.,

23.	Eyes with two distinct bands of dense, darker-coloured pubescence .	*tenax*, L., p. 173.
	Eyes without any such bands ..	24.
24.	Wings with a large, conspicuous brown spot in middle	[p. 167. *maculipennis*, de Meij.,
	Wings grey; abdomen with greenish submetallic spots; eyes bare . ..	*niger*, Wied., p. 163.
	Wings grey; abdomen black, with transverse yellowish-grey bands; eyes with obvious greyish pubescence on lower half; almost a "furry" species	*orientalis*, Wied., p. 170.

E. transpositus, Walk., *pallineuris*, Macq. (p. 160), and *cognatus*, Wied. (p. 175), are not included in the above table owing to no information being available as regards the antennæ. The type of *transpositus* is probably lost. The first two species have the thorax metallic, and *transpositus* possesses, in addition, a large dark spot in the middle of the wing; this spot is absent in *pallineuris*. *E. cognatus*, Wied., falls near *tenax*. *E. multifarius*, Walk., is also not included in the table as the hind femora are rather conspicuously incrassated; see remarks on p. 194.

The several attempts which have been made to subdivide *Eristalis* on account of the unwieldy number of its species cannot be considered successful; as whether the markings of the eyes or those of the thorax be adopted as characters on which to effect the subdivision, by either method groups of species are created which are by no means homogeneous. Such groups in any case must be regarded at most as subgenera. If based on the eye-markings, *plus* the separation of species with plumose arista from those having this organ bare or nearly so, these subgenera would be as follows:—

Arista distinctly plumose on at least basal half	*Eristalis*.
Arista bare or slightly pubescent.	
Eyes with longitudinal dark stripes *	*Eristalodes*.
Eyes with spots or irregular markings.	
Eyes contiguous in ♂ ..	*Lathyrophthalmus*.
Eyes rather widely separated in ♂	*Eristalinus*.
Eyes unicolorous, unmarked.	*Eristalomyia*.

In the first place, since the species *tenax*, L., the universally accepted type of the genus, would under the above arrangement fall in the subgenus *Eristalomyia*, this latter name would have to be replaced by *Eristalis*, *s. str.*, which would necessitate renaming the subgenus with species possessing a plumose arista. Verrall absolutely refused to place the species *tenax*, L., in any other genus except *Eristalis*: but if the above subgenera were to be

* *Stripes* are always longitudinal, to whatever part of the body the term may be applied; if transverse they are called *bands* (or transverse stripes). So far as my own writings go, these terms are never used in any contrary sense. Measurements of the extent of contiguity of the eyes are made from the extreme vertex to the extreme anterior projecting margin of the frons, which overhangs the actual base of the antennæ. Measurements of the width of the frons in the ♀ are made on a line running through the base of the antennæ. In all such cases my measurements have been judged by the eye alone.

regarded as genera, the time-honoured genus *Eristalis* would thus be robbed of its universally accepted type-species. To avoid this the name *Eristalis* would, as stated, have to stand for the present *Eristalomyia*, and the present subgenus *Eristalis* (species with pubescent arista) would have to be renamed. Secondly, this classification is purely arbitrary, as all the subgenera so formed would embrace incongruous species, even when only the Oriental species of the genus are considered. A separation into species with the thorax longitudinally striped and those with no stripes would not be any better, for the same reason. The degree of pubescence or bareness of the eyes has no taxonomic value, as it varies in the sexes of the same species, and is only useful occasionally in separating small sets of species. Under these circumstances I have felt justified in arranging the species in what appear to be natural groups, constructed admittedly on general appearance.

For practical purposes the species may be roughly grouped as follows:—1. Those with a metallic thorax: *transpositus*, *pallineuris*. 2. Æneous or wholly black species: *sepulchralis*, *taphicus*, *niger*, *obliquus*, *lætus*, *maculipennis*, *himalayensis*, *albibasis*. 3. Rather densely pubescent species (*intricarius*-like): *orientalis*, *intricarioides*. 4. Species with the facies of *E. tenax*: *solitus*, *tenax*, *cognatus*, *basifemoratus*, *angustimarginalis*, *simulatus*, *arbustorum*, *polychromatus*, *arvorum*, *5-lineatus*, *tæniops*, *5-striatus*, *tabanoides*, *obscuritarsis*. 5. Species with the facies of *Megaspis*, with short abdomen and a transverse thoracic band: *curvipes*, *latus*, *suturalis*. *E. curvipes* is placed in the last section on account of its transverse thoracic bands.

126. Eristalis transpositus, *Walk.*

Eristalis transpositus, Walker, Trans. Ent. Soc. Lond., n. ser., v, p. 289 (1860).

♂ ♀. "Bluish-green, shining; head black in front, where there is white shining tomentum on each side; antennæ black; abdomen bright cupreous at the tip; tarsi black; wings blackish on the fore half, limpid on the hind border.

"Length of the body $7\frac{1}{2}$–$8\frac{1}{2}$ lines; of the wings 16 lines. Burma."

Type originally in Saunders's collection, probably now lost, and no subsequent information seems available.

The metallic thorax will separate this species and *pallineuris* from all other Indian ones.

127. Eristalis pallineuris, *Macq.*

Eristalis pallineuris, Macquart, Dipt. Exot. ii, 2, p. 46 (1842).

♂. "Face with white tomentum and indistinct brown band. Frons in front with yellowish tomentum and short black hairs.

Antennæ brownish-testaceous. Eyes bare. Thorax metallic green, with yellow tomentum; scutullum yellow, brownish at the base. Abdomen with large contiguous yellow spots on each side, emarginations shining. Femora black, tibiæ yellow, fore and hind pairs brown at tips; tarsi tawny. Halteres yellowish. Wings clear, a little yellowish at base, veins pale; 1st basal cell extending to middle of discal cell.

"From Bengal [*Duvaucel*]. Paris Museum."

I have seen no specimen of this species, nor can I glean any information as to which subgenus it should be referred.

128. **Eristalis sepulchralis**, *L.* (Pl. IV, fig. 3.)

Musca sepulchralis, Linnæus, Syst. Nat. Ed. 10, p. 596 (1758).
Musca atra, Harris, Expos. Engl. Ins. p. 58, pl. xv, fig. 11 (1782).
Syrphus tristis, Fabricius, Ent. Syst. iv, p. 303 (1794).

♂ ♀. *Head*: ♂, eyes rather widely separated, frons from vertex rather rapidly narrowing to about half-way to base of antennæ, below which point it widens again; at its narrowest point it is about half as wide as at vertex and about one-ninth width of head at that part. Eyes with spots or irregular black markings and brownish-grey pubescence. Vertex and upper part of frons blackish with black pubescence, lower part with grey dust and pale yellow pubescence. Face black, with grey dust and yellowish-grey to whitish pubescence; central knob small, black, shining, bare. Antennæ black, base of 3rd joint often orange, arista bare. Occiput dark grey, with long blackish hairs behind vertex and greyish hairs on lower part. In ♀, frons with almost parallel sides nearly to antennæ, thence gradually widening as does the face, both covered with yellowish-grey dust, leaving the ocellar triangle, a small spot in middle of frons, the small central knob, front edge of mouth and a small space between face and cheeks, shining black. Pubescence black above antennæ, yellowish on rest of frons, yellowish or yellowish-grey on face. 3rd antennal joint generally more reddish than in ♂ and eyes less pubescent. *Thorax* black; a pair of more or less distinct, short, narrow, grey, well-separated stripes from anterior margin, not reaching suture, and traces of darker longitudinal stripes; humeri and extreme lateral margins of dorsum for some distance, grey; pleura more or less shining blackish. Pubescence of thorax dense, yellowish-grey; scutellum with a dull æneous tinge and yellowish-grey pubescence. In ♀, dorsum light grey with four subequal, equidistant, longitudinal, shining black stripes from front to hind margin, often more or less narrowed at the ends; sometimes some greyish dust on upper part of sternopleura. *Abdomen* short, dull æneous; a large, deep black spot on 2nd segment from anterior margin nearly to hind margin, cut away deeply on each side, thus leaving a large æneous triangle filling each outer third of the segment; hind margin æneous. A similar, rather smaller spot on 3rd segment; 4th segment with a small black spot at base. Pubescence

yellowish-grey, more whitish at sides, black on hind margins of 3rd and 4th segments; genitalia rather large, rounded, mostly concealed, greyish-black. Venter black, pubescence pale; hind margins of segments narrowly orange. In ♀, abdomen æneous, dull on disc of 1st segment, on a large **X**-shaped spot on 2nd segment, and on a dorsal line on basal half of 3rd segment. Pubescence short and whitish at sides, yellow on disc but black on hind margins of 3rd and 4th segments. *Legs* black; knees and often base of anterior tarsi more or less orange; pubescence mainly yellowish, longest on basal two-thirds of hind femora, blackish on apical third; short black pubescence on hind side of anterior tibiæ and on basal half of hind tibiæ. In ♀ the orange colour is a little more extensive. *Wings* nearly clear, especially in ♀; stigma very small, dark brown; halteres and squamæ yellowish.

Length, 8–9 mm.

Described from Indian Museum specimens from Kashmir and China, with additional notes from Verrall's description of British examples. Shanghai, 1.v.1906; Hankow, 22–26.iv.1906 (*Brunetti*). Widely spread in Europe.

129. **Eristalis taphicus**, *Wied.*

Eristalis taphicus, Wiedemann, Auss. Zweifl. ii, p. 191, ♀ (1830).
Eristalis ridens, Walker, List Dipt. Brit. Mus. iii, p. 610, ♀ (1849).

♂ ♀ *Head*: eyes in ♂ contiguous for less than half the distance from vertex to frons, front facets slightly larger than the rest; vertical triangle and upper part of eyes with yellowish-grey pubescence. Frons and face with yellowish-grey tomentum, the former with longer yellowish hairs also, latter with inconspicuous very fine white hairs; face very slightly produced diagonally forwards and not at all below eyes themselves in profile. Antennal prominence shining brown, upper margin sometimes bright yellow; antennal 1st and 2nd joints black, 3rd reddish-brown, upper side black; arista bare, reddish-brown. Central bump shining black, bare, small; mouth-border black, bare, except for a little grey dust in the centre. Occiput grey-dusted, extreme side margins shining white; bright yellow pubescence on lower part of head. In ♀, frons barely one-fifth of head at vertex, sides parallel on upper part, gradually separating towards level of antennæ; face also gradually widening to its lowest margin. Frons shining black, densely pubescent, covered with yellowish-grey tomentum and rather dense concolorous pubescence. Face covered with white tomentum and pubescence. *Thorax*: dorsum grey, with four subequal, nearly contiguous, longitudinal, black stripes, narrowed on anterior margin and often more or less united on hind margin; whole surface with dense yellowish-brown pubescence. Scutellum æneous, with dense yellowish-brown pubescence. Pleura moderately dark ash-grey, with pale yellowish-white pubescence. *Abdomen* shining æneous, minutely punctate, with dense pubescence, which is mainly brownish but more whitish towards and on sides and

anterior half of 2nd segment. Venter shining black, with whitish pubescence; hind margins of segments whitish. *Legs*: coxæ and femora shining black, with a little yellowish pubescence, tips of latter orange-brown; tibiæ with basal half yellowish, remainder blackish-brown, all with pale yellow pubescence; tarsi blackish-brown, at least on upper side, middle pair (and sometimes fore pair also) with first two tarsal joints brownish-orange. *Wings* clear; stigma narrowly brownish-yellow; subcostal cell very pale brownish-yellow; halteres yellowish; squamæ and fringe whitish.

Length, about 9 mm.

Described from a short series in the Indian Museum from Karachi (*Cumming*). Lucknow, 4. vi. 1908, on melon; 21. i. 1898; Baroda, 1. iv. 1909; Allahabad, 11. xii. 1905 (*Howlett*); Delhi, iii. 1913 (*Howlett*); Bombay, 21. iii. 1905; 2. iii. 1905, on sea-weed; Baluchistan (*Cleghorn*). The type of *E. ridens*, a ♀ from Albania, is obviously conspecific with *E. taphicus*. Further specimens in the British Museum are from China and Corea, and (as *ridens*) from South France, Monaco, Cyprus and India. *Type* ♀, from Egypt, in Frankfurt Museum.

Though regarded by many authors as a variety of *æneus*, Scop., *E. taphicus* appears to be a valid species. The thorax is always obviously striped, though often less distinctly in the ♂, whereas *æneus* has nominally a wholly æneous thorax, although in occasional individuals on close examination traces can be seen of a disposition to divide into four broad practically contiguous stripes. Other characters are a "reddish" spot on the anterior corners of the venter, but this varies from nearly white, through yellowish to reddish-brown or orange. There is also a whitish dust spot or a whitish reflection on the mesopleura, and a round, sometimes very conspicuous, similar spot on the sternopleura. The pale spots on the venter are present in *æneus* though only whitish or yellowish, but the spots on the thorax are always absent in that species. The black stripes on a grey or whitish ground in *taphicus* are as distinct in normal specimens as in any species of the groups with the thorax striped, especially in the female; they are closer together in the male and might easily be confluent in individuals, but in such cases the greyish spots on the pleuræ should determine the species. One ♂, however, in the British Museum from Albania is intermediate, as the grey spot is present on the sternopleura but not on the mesopleura, and the dorsum of the thorax is just perceptibly though very narrowly divisible into four almost contiguous black stripes.

130. **Eristalis niger**, *Wied.*

Eristalis niger, Wiedemann, Anal. Ent. p. 38 (1828); id., Auss. Zweifl. ii, p. 183 (1830); de Meijere, Tijd. v. Ent. li, p. 260, ♂ descr. (1908).

Eristalis bomboides, Walker, Proc. Linn. Soc. Lond. iv, p. 119 (1860).

Eristalis obscurata, Walker, op. cit. v, p. 239 (1861).

Eristalis tortuosa, Walker, op. cit. v, p. 266 (1861).

♂ ♀. *Head* black; in ♂, eyes unicolorous, pubescent on upper part; frons prominent, shining black, with long, thick, black pubescence. In ♀, frons narrower at vertex than at level of antennæ, where it is less than one-third width of head; black, with dense dark yellowish-brown pubescence on upper part; shining black, with fine black pubescence on lower part; a grey dust-spot on each eye-margin below middle; eyes bare. In both sexes epistome moderately produced, shining black or dark steel-blue, with whitish pubescence, leaving a broad median bare stripe. Antennæ blackish-brown, arista bare. *Thorax* black; in front of suture a very conspicuous (in good specimens) narrow ash-grey stripe, carried uninterruptedly over pleuræ (where it bears some whitish pubescence) to the greyish sternopleura; rest of dorsum with very dense, short dark brown pubescence; rest of pleuræ yellowish-grey, with some sparse yellow pubescence on pteropleura. Scutellum æneous-black with brownish pubescence. *Abdomen* in ♂ black, black-haired; a metallic-grey broad band on front margin of 2nd segment, with a similar narrower one, almost interrupted, on front margin of 3rd and 4th segments; hind margins of 2nd and 4th segments metallic grey and that of the 3rd with a broad triangular spot. In ♀, 1st segment black with a shining æneous hind border and on each outer third dense, very shining, gold-yellow pubescence; 2nd segment with a fairly broad black front and hind margin, connected by a median black stripe widening hindwards, leaving rest of surface to form two large, æneous, green-tinged spots; 3rd segment greenish-æneous, with a moderately broad black band extending from the hind corners forwards to about middle of segment; 4th segment similar to 3rd, the black band across middle of segment slightly arcuate; 5th segment wholly greenish-æneous. Pubescence very dense, brownish-yellow, but very short and remarkably inconspicuous. Venter obscurely yellowish on basal half towards sides, remainder black. *Legs* black, basal half of middle (♂), or all (♀), tibiæ yellowish, pubescence yellowish-white. *Wings* "pale brownish-yellow, darker in ♂" (*Wiedemann*); in the ♀ before me almost uniformly moderately dark grey, stigma barely darker; squamæ yellow with concolorous fringe; halteres yellowish.

Length, 9–10 mm.

Redescribed mainly from a large ♀ in good condition in the British Museum from Singapore, and a ♂ and ♀ in the Indian Museum. It is recorded also from Bengal, Java, Borneo and Papua. The type ♂ ♀ of *bomboides*, type ♀ of *obscurata*, and type ♂ of *tortuosa* are all in the British Museum and are certainly conspecific. The synonymy is by Major Austen. *Type* (♀) from Java, in Wiedemann's collection.

131. **Eristalis obliquus**, *Wied.* (Pl. IV, fig. 4.)

Eristalis obliquus, Wiedemann, Anal. Ent. p. 38 (1828); id., Auss. Zweifl. ii, p. 187 (1830); de Meijere, Tijd. v. Ent. li, p. 248, pl. vii, figs. 17, 18, abdomen (1908).

♀ *Head*: eyes bare; frons and face enclosed by two straight but gradually diverging lines from vertex to mouth-opening; frons rather less than one-third of head at base of antennæ, covered, as is face also, with brownish-yellow tomentum, former bearing brown hairs, latter with yellowish pubescence; vertex with black hairs; face only moderately produced; central bump distinct but small, brownish-yellow, bare; mouth region nearly bare; head barely perceptibly produced below eyes themselves in profile. Antennæ and arista orange-brown, latter bare. Occiput blackish-grey with a little pale pubescence, upper margin with short black pubescence, lower one with a little, longer, whitish pubescence. *Thorax*: dorsum yellowish-grey tomentose, with four longitudinal shining black stripes from anterior to posterior margin, of about equal width and nearly equidistant, the two median ones nearer together and sometimes practically united. Sides of thorax moderately shining black; mesopleura and upper part of sternopleura grey-dusted. Scutellum brownish-yellow, a little darker at base, with yellow pubescence and black hairs basally. *Abdomen* dull black; 1st segment pale yellowish; 2nd with a broad brownish-yellow band on anterior margin, very much contracted behind in middle, widened at sides, nearly filling side margins except on hind corner of segment; hind margin of segment shining black; 3rd and 4th segments dull black, the hind margins with a very shining black band, broadest in middle; on each of these segments is a rather large, approximately oval, yellowish-grey spot on each side, diagonally placed; upper end of each spot on anterior margin, lower end nearly reaching middle of side margin; 5th segment a small replica of 3rd and 4th. Pubescence of abdomen pale yellowish-grey; venter mainly yellowish with pale yellowish pubescence. *Legs* black; tips of femora rather narrowly, basal half of fore, a little more than half of middle and hind tibiæ rather broadly at base, yellowish; 1st and 2nd tarsal joints yellowish or brownish-yellow, remainder black. Pubescence of legs rather short, uniformly yellowish except on front side of hind tibiæ, where it is black. *Wings* quite clear except a little yellowish at base; stigma almost imperceptible, but with a minute elongate brown mark at inner and outer ends; halteres yellowish.

Length, 8–10 mm.

Described from a few indifferent examples in the Indian Museum from Calcutta, 27. iv. 1916; 30. v. 1914; 8. vi. 1907; salt lakes near Calcutta, on *Avicennia* blossoms, 30. v. 1914 (*Gravely*); Sunderbunds, 21. viii. 1909 (*Jenkins*); Coimbatore, S. India, 25. i. 1913. De Meijere records a ♂ from Java, and states that it is exceedingly like the ♂ of *arvorum*. *Types* (♂ ♀) from Bengal, in Wiedemann's and Westermann's collections.

132. **Eristalis lætus**, *Wied.* (Pl. IV, fig. 2.)

Eristalis lætus, Wiedemann, Auss. Zweifl. ii, p. 192 (1830).

♂ ♀ *Head*: in ♂ eyes contiguous for a very short space, perhaps one-fifth of distance from vertex to base of antennæ, dark

red with small darker spots and markings, giving a somewhat brain-like appearance; shortly and finely pubescent on upper and front part only. Vertical triangle black with some black hairs; frontal triangle shining black, wholly covered with black pubescence, with a small prominence in centre; anterior edge brownish-orange. Face æneous-black with whitish-grey pubescence; central bump small but rather conspicuous, shining black, bare, as is the lowest part of the head for a moderately broad space. Epistome not appreciably produced below eyes themselves in profile, but directed diagonally forwards and downwards. Antennæ blackish, sometimes brownish-orange on under side of 3rd joint; arista brown, microscopically pubescent at base. In ♀, frons varying from slightly narrower to slightly broader than one-third of head at base of antennæ; moderately shining black with grey or yellowish-grey tomentum, wholly with black pubescence; a dull black, rather broad, transverse band from eye to eye just above middle of frons, generally slightly extended downwards in middle; vertex and a space above antennæ shining black, with the small but obvious, bluntly conical, bump towards anterior margin as in ♂. *Thorax* in ♂ æneous-black, shining, with brownish-grey pubescence; sides æneous, sternopleura æneous-grey, all with yellowish-grey pubescence; scutellum shining black, with a slight bluish tinge and brownish-grey pubescence. In ♀, dorsum shining black; on humeri and thence along side margins to suture yellowish-grey or ash-grey, which is continued thence as a fine stripe on each side nearly to posterior calli; two median, well separated, very narrow, similarly coloured stripes from anterior to posterior margin, where they merge into a more or less grey space in front of scutellum. Pleuræ yellowish-grey or nearly ash-grey, sometimes slightly shining. *Abdomen* in ♂: 1st segment dull blackish-grey, black at base in middle; 2nd dull black, hind margin rather narrowly shining in centre; a broad triangular æneous spot on each side margin, extended narrowly on inner side as a fine line, disappearing before middle of segment; 3rd segment shining black, with a transverse æneous spot on each side margin as in 2nd segment; having also a pair of transverse greyish narrow spots overlying the æneous spots, but well clear of side margins of segment, their inner ends almost contiguous; also a moderately wide, nearly straight, dull black band with parallel edges across middle of segment, prolonged in centre to anterior margin; 4th segment dull black with two greyish transverse spots as on 3rd but united, forming a curved band with the middle part touching anterior margin; hinder third of segment, except at sides, shining black. Pubescence of abdomen brownish-grey but more whitish towards side margins; venter mainly shining black with a little whitish pubescence; hind margins of segments grey. In ♀, the elongate transverse spots on side margins of 2nd segment yellowish and translucent, with an overlying narrow grey spot on each, much as in 3rd segment in ♂; these grey spots on 3rd and 4th segments broader and united, forming a very broadly

open, inverted V-shaped band, its centre just touching anterior margin of segment; these bands in some specimens are barely broader than in ♂ and more yellowish-grey. *Legs* black; all femora narrowly orange at tip; basal half of anterior tibiæ and base of hind pair narrowly, orange; 1st joint of fore, 1st and 2nd joints of middle tarsi, more or less orange. Pubescence of legs pale yellowish. *Wings* nearly clear, a minute dark brown spot at inner end of the very small brownish stigma; halteres orange.

Length, 6–8 mm.

Described from a limited number of each sex. Ootacamund, S. India, 20–31. xii. 1912 (*Fletcher*); Mysore, 4000–5000 ft., 2–12. xi. 1912 (*Fletcher*); Pusa, ix. 1907; Katmandu, Nepal; Abu (*Nurse*); Shillong, 10–12. x. 1914. Originally described from China.

133. **Eristalis maculipennis**, *de Meij.*

Eristalis maculipennis, de Meij. Tijd. v. Ent. li, p. 261, ♂ (1908).

♂ ♀ *Head*: in ♂, eyes bare, closely contiguous for nearly half the distance from vertex to base of antennæ, leaving a narrow vertical triangle, black with a few black hairs, and reddish ocelli; frontal triangle rather prominent, shining black with black hairs; face with median black stripe and moderately prominent blunt central bump, nearly bare, shining; rest of face with grey tomentum and black hairs. Head barely produced below level of eyes even in front, so cheeks are practically absent, but this part has short whitish hairs. Antennæ dark brown, arista brownish at base, very little plumose at base only. Occiput blackish, no margin appearing beyond level of eyes. In ♀, frons about one-fourth width of head at level of antennæ, narrowing gradually to vertex, dull black on upper two-thirds, lower third shining black. *Thorax* dull brownish-yellow, dorsum more or less blackish with very short yellowish pubescence; scutellum brownish-yellow with concolorous pubescence. *Abdomen* conical, longer than thorax, especially in ♀ In ♂, brownish-yellow, rather shining; an indistinct curved narrow band, convex side in front, across middle of 2nd segment; 3rd segment with a trace of a pale anterior margin, the remainder blackish-brown, as are the entire 4th and 5th segments. Pubescence yellowish on pale parts of abdomen and black on the back parts. Venter brownish-yellow, blackish in middle of 2nd segment and on most of the 3rd and 4th segments, with a little pale pubescence. In ♀, abdomen darker brown; 2nd segment blackish towards all four corners, also 3rd and 4th segments posteriorly; 5th all black. Venter mainly black. *Legs* all black with short black pubescence except for a little yellow pubescence on upper side of hind femora; basal half of anterior tibiæ and extreme base of hind pair yellowish. *Wings* yellowish; stigma dark blackish-brown, large; a large dark brown suffusion thence extending over anterior cross-vein, tip of 1st basal cell and base of 3rd posterior cell; a similar suffusion

(apparently sometimes joined along the costa to the previous one) over tips of 1st, 2nd and 3rd veins; halteres brownish-yellow.

Length, 14 mm.

Described from 1 ♂, Tenasserim Valley (*Doherty*) and 1 ♀, Margherita, Assam, the latter labelled by Bigot "? *exterus*, Walk." A ♀ in the British Museum from Mt. Dulangan, Mindoro, Philippine Is., 5000 ft., xi. 1895–i. 1896 (*Whitehead*). Judging from the description the species appears quite distinct from Walker's *exterus*.

Type in the Hungarian National Museum.

134. **Eristalis himalayensis**, *Brun.*

Eristalis ursinus, Bigot (nec Jaennicke), Ann. Soc. Ent. France, (5) x, p. 215 (1880).

Eristalis himalayensis, nom. nov., Brunetti, Rec. Ind. Mus. ii, p. 70 (1908).

♂ ♀ *Head*: eyes wholly pubescent, but with an additional band of very dense dark brown pubescence running from near vertex down the middle of each eye to lower corner; in ♂, eyes closely contiguous for a short distance; vertical triangle nearly equilateral, with brownish ocelli and long blackish-brown hair; frontal triangle blackish, rather dull, but shining towards tip, wholly covered (except the more or less shining brown extreme

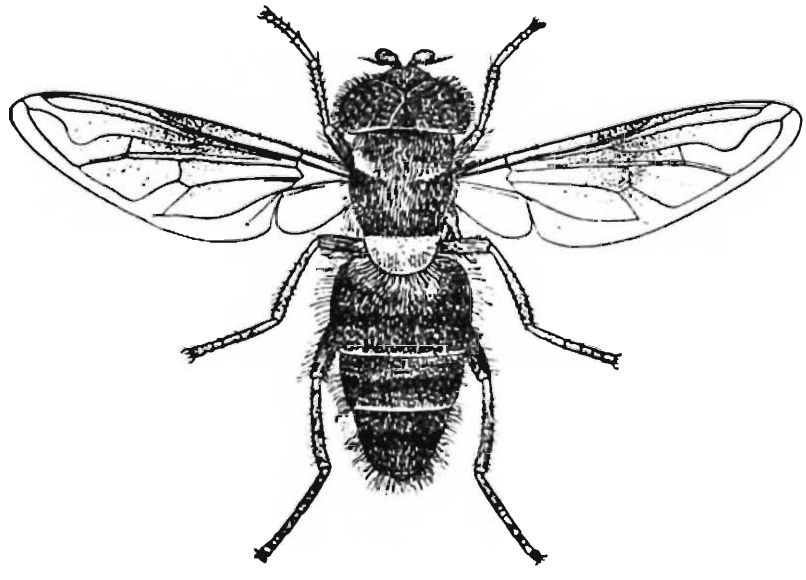

Fig. 35.—*Eristalis himalayensis*, Brun., ♂.

apical margin) with long black hairs. Face only slightly cut away below antennæ, anterior edge nearly straight, moderately shining black with yellow pubescence, which is nearly absent on cheeks and mouth-border and on the not prominent central bump; lowest part of head descending barely below the eyes themselves in profile, but extended diagonally downwards to a distance of half their height. Antennæ black, arista brownish, strongly plumose

on basal half to three-fourths. Proboscis black. Occiput blackish, with long brown hairs on upper margin, which disappear gradually towards side margins; lower half with bright yellow hairs that gradually lengthen towards under side. *Thorax* blackish, a just perceptible greyish band along suture and traces of another on anterior margin. Dorsum, sides and the bright yellow scutellum with dense, long, bright yellowish pubescence. *Abdomen* a little longer than thorax, bluntly conical; black with pubescence dense, short, and black except on 1st segment and anterior corners (more or less) of 2nd segment, where it is yellowish; some yellowish hairs scattered over all the dorsum, and a weak fringe of them on hind margins of 2nd and 3rd segments, which margins may be just perceptibly pale. Venter blackish-grey, darker at tip; pubescence yellowish, black towards tip. *Legs* black; anterior knees narrowly and about basal half of anterior tibiæ, also middle metatarsi, yellowish. Pubescence of legs generally following ground-colour, but rather long, thick, yellow hair on hind side of anterior femora, and yellowish-brown pubescence on anterior and upper sides of hind femora. *Wings* yellowish-grey; stigma indefinitely dark brown; a large yellowish-brown suffusion from middle of costa filling about the middle third of the anterior half of the wing and extending broadly and indefinitely along most of the veins; halteres and squamæ yellow, latter with yellow fringe.

Length, 15–18 mm.

Described from a number of both sexes in the Indian Museum and other collections. Sikkim (*Knyvett*; *de Nicéville*); Darjiling, 9000–12,000 ft. (*Burkill*); Chitlong, Nepal; Naini Tal; Phagu, Simla District, 9000 ft. (*Annandale*; *Kemp*); Tolpani, Gahrwal District (*Tytler*). Apparently common along the Himalayas at about 5,000 ft. and upwards during most of the summer. Originally described by Bigot from India. The name *ursinus* was used by Jaennicke for a Javan species (Abh. Senckenb. Natur. Ges. vi, p. 401, 1867).

135. **Eristalis albibasis**, *Big.*

Eristalis albibasis, Bigot, Ann. Soc. Ent. France, (5) x. p. 215 (1880).

♀ *Head*: eyes sparsely pubescent, but with a little, longer, pale yellowish hair on lower part and a longitudinal band of dense dark brown pubescence as in *himalayensis*; frons nearly twice as wide at level of antennæ (where it forms rather more than one-third of the head) as at vertex; moderately dark brown, shining, with vertex broadly a little darker, also a not very distinct transverse darker band across middle, all the frons bearing long blackish-brown pubescence. Face a little lighter brown, shining, with rather sparse yellowish hairs, descending diagonally below eyes for a distance equal to about two-thirds of their height, but only slightly below eyes themselves in profile; anterior margin slightly curved, median bump not prominent. Antennæ black, arista plumose for two-thirds of its length. Occiput dark grey, with very narrow silvery

margin, long brownish-yellow hairs on upper margin, and yellow hairs on lower margin; but the hairs are shorter and disappear at the middle of the side margins. *Thorax* practically as in *himalayensis*. *Abdomen* dark brown, rather shining; 1st segment whitish, broader than in *himalayensis*. Pubescence of abdomen very short, yellowish, much longer on 1st segment and anterior corners and sides of 2nd. Venter dark brown with a little pale pubescence. *Legs* yellowish-brown; apical half of anterior tibiæ, all the tarsi (except middle metatarsi) and hind legs, darker brown. *Wings* absolutely clear, stigma absent; halteres and squamæ brownish-yellow.

Length, 11 mm.

Described from one ♀ in the Indian Museum, Simla, 7000 ft., 16.v.1909 (*Annandale*). This is undoubtedly a valid species, though it bears a considerable resemblance to *himalayensis*, from which it is easily separated by the clear wings, greater depth of epistome below the eyes, and minor characters. The *type* (in Bigot's collection), which I have compared, was described from India.

136. **Eristalis orientalis**, *Wied.*

Eristalis orientalis, Wiedemann, Anal. Ent. p. 38 (1828); id., Auss. Zweifl. ii, p. 181 (1830); de Meijere, Tijd. v. Ent. li, p. 257 (1908).

♂ ♀. *Head*: eyes in ♂ wholly with rather dense greyish pubescence; closely contiguous for about one-third of the distance from vertex to antennæ; vertical triangle small, black, with black hairs; frontal triangle considerably projecting, black, with long, rather coarse, grey hair; face slightly cut away below antennæ, thence downwards forming a gentle, not prominent, curve with central bump not obvious; epistome not or barely descending lower than eyes themselves in absolute profile, and but slightly diagonally downwards and forwards; the whole covered with long, rather coarse, grey pubescence; a median bare, shining black stripe with somewhat irregular limits. Antennæ and the bare arista black. Occiput black, with greyish tomentum; upper margin with black hairs, lower one with grey pubescence. In ♀, frons and face gradually widening from above downwards; at level of antennæ distinctly more than one-third width of head; dusted with brownish-yellow, frons with rather dense, moderately long, blackish-brown pubescence, face with finer, pale yellow pubescence, leaving a rather broad, shining black, bare median stripe with ill-defined sides. *Thorax* with nearly anterior half of dorsum brownish-grey, bearing yellowish pubescence; rest of dorsum moderately shining black with dense black pubescence; sides of thorax ash-grey with yellowish pubescence. Scutellum conspicuously orange with yellow pubescence. *Abdomen* black, slightly shining; 1st segment greyish with yellow pubescence; 2nd with a large, triangular, brownish-yellow spot on each side

covered with dense orange-yellow pubescence, the space between these spots bearing yellow pubescence, the rest of the segment dense black pubescence; 3rd and 4th segments with a broad band of dense yellow pubescence on anterior margins and a not very conspicuous æneous band across middle of black part of each; the black parts with dense black pubescence, but the side margins of abdomen with yellow pubescence; last segment shining black with black pubescence. Venter pale yellowish on about basal half, narrowly grey at base, rest black, all with pale yellow pubescence. *Legs* black, basal half of fore tibiæ and about three-fourths of middle pair brown, pulvilli orange; hind femora distinctly thickened, hind tibiæ curved; pubescence of legs mainly yellowish, but black on hind legs except on upper side of femora, where it is yellowish. *Wings* yellowish-grey, generally distinctly but irregularly brownish from stigmatic region to tip, also slightly at base; halteres brownish-yellow.

Length, 12–14 mm.

Described from a few examples from Sikkim in the Indian Museum. Singla, Darjiling District, 1500 ft. (*Lord Carmichael's* collector). Originally described from a specimen from Java, in Westermann's collection, probably now in Vienna Museum.

137. **Eristalis intricarioides**, sp. nov.

♀. *Head*: frons and face with straight but not parallel sides, gradually widening from vertex to lowest point of eyes, where the face is twice as wide as the frons at the vertex. Frons at base of antennæ about one-third the width of the head; rather dull black, covered with yellowish dust (except just above antennæ) and long black pubescence; tip of frons shining brown. Face but little cut away below antennæ, but thence considerably produced into a long blunt epistome with bluntly conical tip, descending a considerable distance downwards below eyes themselves in profile, but not extending forwards beyond base of antennæ; wholly black with a little grey dust and rather long shaggy yellow hair. Antennæ with 1st and 2nd joints blackish, 3rd dull reddish-brown, arista brownish, strongly plumose on basal three-fourths. Eyes with rather dense brownish-yellow pubescence. Occiput greyish-brown with a little yellow hair round margin. *Thorax* black with (apparently) microscopic black tomentum, wholly covered (sides included) with dense brownish-yellow pubescence, with darker brown hairs intermixed; pubescence paler or pleuræ; scutellum dull orange-yellowish with only bright yellow long hairs. *Abdomen* black; sides of 2nd segment at base more or less greyish; 1st segment and base of 2nd except at sides, with long, conspicuous, pale yellow pubescence; rest of abdomen apparently all covered with rich, long, dense, brownish-red pubescence. Venter blackish-grey with (apparently) a little sparse yellowish hair. *Legs* black, with yellow pubescence; some black hair on hind side of fore femora. *Wings* pale grey; stigma reduced to a small black spot at tip of auxiliary

vein; an ill-defined but obvious yellowish-brown, rather narrow suffusion extending from stigma nearly to hind border; halteres brownish.

Length, 12 mm.

Described from a ♀ from Sikkim (*Knyvett*); in the Indian Museum. A furry, *intricarius*-like species, easily recognised by the colours of the abdominal pubescence. *E. intricarius* has not been recorded from India but might easily occur in the Himalayas. The two species may be differentiated thus. In *intricarius* the basal half of the tibiæ is yellowish, the 2nd abdominal segment wholly black, the epistome distinctly shorter than the height of the eyes. In my new species all the tibiæ are wholly black, the middle metatarsi quite black; the ground-colour of the base of the 2nd abdominal segment is grey, and the epistome is fully as long as the height of the eyes.

138. **Eristalis solitus**, *Walk.*

Eristalis solitus, Walker, List Dipt. Brit. Mus. iii, p. 619 (1849).
Esistalis barbatus, Bigot, Ann. Soc. Ent. France, (5) x, p. 214 (1880).

♂ ♀ *Head* in ♂ with eyes closely contiguous for a distance about equal to the length of the frons, with rather long, dense, dark brown pubescence; upper facets much larger than lower ones; lower half of eyes with small brown spots. Vertical triangle moderately large, black, with dark brown and long bright yellow hairs intermixed. Frons black, with blackish-brown, long, thick pubescence; face black with yellowish dust; a barely perceptible median black line, sometimes absent, and pale yellow, moderately long pubescence which is almost microscopic in the black mouth-region. Extreme front edge of antennal prominence brownish-orange. Antennæ black, arista long, feathered on basal half above and below. Occiput and cheeks ash-grey with pale yellow pubescence, which is long on under side of head, gradually dying away at sides of eyes and becoming very long behind vertex. In ♀, frons and face gradually widening from top to bottom, forming rather more than one-third of head at level of antennæ. Frons with dense black or dark brown pubescence; pubescence of face more whitish than in ♂ *Thorax* blackish-brown; a moderately broad transverse stripe from side to side along suture, the anterior margin more or less narrowly, the hind margin rather broadly, and the humeri, greyish. Pleuræ grey, scutellum brownish-yellow, whole dorsum, pleuræ and scutellum with long, dense pubescence varying from bright yellow to brownish-yellow; centre of scutellum bearing some black hairs intermixed. *Abdomen*: ground-colour mainly black; 1st segment grey; 2nd with a pair of very large triangular spots occupying the major part of the surface, including whole of side margins except narrowly behind, their apices near together in the median line but never touching; hind margin of segment also narrowly yellow; 3rd segment

mainly yellow on anterior half, but with a central black spot, which is more or less diamond-shaped, generally just touching anterior margin with its upper angle, while the lower angle is joined more or less broadly to the black hind part of the segment; extreme hind edge of latter yellow. Hind margin of 4th segment narrowly but distinctly yellow, orange- or reddish-brown. Pubescence mainly following ground-colour, but brownish-yellow on 4th segment and wholly yellow at tip. Venter yellowish on basal half, with an indistinct median blackish stripe, hinder half black; pubescence pale yellow throughout. In ♀, the triangular spots on the 2nd abdominal segment do not occupy quite so much of the side margins, and they narrow rapidly on the inner side, partaking more of the nature of elongate spots with parallel sides, broadening suddenly towards side margins. The amount of yellow on the 3rd segment is much reduced and the black median spot in that part is broader and more irregular in shape. *Legs* shining black; tips of femora narrowly, tibiæ on about basal half, a little more than half on middle pair, anterior tarsi to a greater or less extent at base, yellow or orange. Pubescence pale yellow, but some short black hairs intermixed on black parts of tibiæ and tarsi. *Wings* nearly clear; yellowish at base and on costa; stigma blackish-brown, and the surrounding surface of the wing has the faintest brownish-yellow suffusion in this region; halteres yellow.

Length, 11–12 mm.

Described from a large series of both sexes in the Indian Museum, and in the Pusa, my own and other collections, from hilly regions in India, Burma, Assam, West China and Japan. Apparently common in the Himalayas throughout most of the summer; occurring at least at Simla as early as April (*Nurse*). The unique *type* ♂ of *barbatus* in Bigot's collection is in wretched condition, but it is undoubtedly only *solitus*, Walk.

Type in British Museum.

139. Eristalis tenax, *L.*

Musca tenax, Linnæus, Syst. Nat. Ed. 10, p. 591 (1758).
Eristalis tenax, Verrall, Brit. Flies, Syrph. p. 505, figs. 350-352: auctt. var.
Musca porcina, De Geer, Ins. vi, p. 98 (1776).
Musca arbustorum, Schrank, Enum. Ins. Austr. p. 902 (1781).
Conops vulgaris, Scopoli, Ent. Carn. p. 960 (1763).
Conops fuscus, Scopoli, Ent. Carn. p. 961 (1763).
Eristalis campestris, Meigen, Syst. Beschr. iii, p. 387 (1822).
Eristalis hortorum, Meigen, loc. cit.
Eristalis sylvaticus, Meigen, op. cit. p. 388.
Eristalis vulpinus, Meigen, loc. cit.
Var. *alpinus*, Strobl, Mitt. Ver. Steierm. xxix, p. 185 (1893).

♂ ♀ *Head*: eyes pubescent, with two longitudinal stripes of denser brown hair down the middle of each eye. Vertex with black hairs; frons and face covered with yellowish tomentum,

former with brown, latter with yellowish pubescence; face slightly cut away below antennæ, but produced forwards and downwards, forming a large prominent epistome, which however in profile barely extends below the eyes themselves; also with a black, moderately wide, median stripe, which on the central bump is free from pubescence; cheeks black. Antennæ dark brown, arista long, bare. In ♀, frons nearly one-third width of head, shining black, with black and yellow hairs mixed. Back of head in both sexes with yellowish pubescence, longer on lower half. *Thorax* shining brownish-black, duller in front, pubescence short, tawny; a tuft of paler hairs on post-alar calli; scutellum brownish-yellow, with concolorous pubescence. *Abdomen*: ♂, 1st segment black, 2nd and 3rd mainly brownish-orange; a basal black band on 2nd segment, narrowing towards sides, not reaching side margins, joined by a median stripe to a similar band on hind margin leaving the extreme margin pale; a similar pattern on 3rd segment, the basal band smaller, often absent, the hinder band broader and broadly attaining side margins; rest of abdomen black. Considerable variety exists in the relative extent of black and orange markings. In ♀, the orange is generally confined to the 2nd segment, more or less encroaching on the 1st at the sides; also the extreme base, the hind margin, and the sides anteriorly, of the 3rd segment are orange. Venter in both sexes yellowish-orange on basal half with an indefinite median dark stripe, blackish on hind half. Genitalia concealed. *Legs* black; knees and basal third of fore and basal half of middle tibiæ, yellow; base of middle tarsi and basal half of hind tibiæ often brownish or brownish-yellow; hind femora sometimes brownish-yellow at base or up to basal half. Pubescence of legs yellow, abundant on hind femora; coarse black hairs beneath apical part of hind femora. Hind tibiæ compressed about the middle, rather twisted, with abundant tawny pubescence, forming a ciliation on nearly all the hinder side, and with a longer coarse black ciliation on front side just beyond middle. *Wings* greyish, brownish on anterior half; a small quadrate dark brown spot below tip of auxiliary vein, enclosing a small cross-vein; squamæ dull yellowish, thoracal pair with dense coarse yellowish fringes; halteres dull brownish-yellow.

Length, 13–15 mm.

The above description is mainly abbreviated from Verrall. Probably the most cosmopolitan species of SYRPHIDÆ known, common almost everywhere throughout the summer in the East. India; Ceylon; Burma; Assam; the Malay Peninsula and eastwards to Japan. I have taken it myself from Mussoorie to Yokohama, through the Straits and in China. It also occurs in Australia. The variety *campestris*, distinguished by the pale basal half of the hind femora, is almost as common in India as the typical form. I have taken it in both the hills and the plains, and as far east as Shimonoseki, Japan.

140. Eristalis cognatus, *Wied.*

Eristalis cognatus, Wiedemann, Anal. Ent. p. 37 (1828); id., Auss. Zweifl. ii, p. 180 (1830).

♂ *Head* black; epistome orange-yellow with yellowish shimmer; face with broad black stripe and black cheeks; frons with whitish shimmer, black in middle immediately above antennæ; latter brownish-black. *Thorax* black, grey-haired; scutellum dusky yellowish. *Abdomen* black; 2nd segment with a pair of well-defined, yellow, elongate triangular spots, placed transversely, rather narrowly joined to the yellow hind margin of the segment, and extended at sides as far as 1st segment. Spots on 3rd segment not very broad, only touching anterior margin for a short distance and distinctly separated from each other; 4th segment with a narrow, barely visible, yellow streak towards each side at base. Tip of abdomen black; venter black, 1st, 2nd and 3rd segments yellow, 3rd with a pale brown spot in middle. *Legs* blackish-brown, all knees yellowish; basal half of fore tibiæ whitish. *Wings* barely yellowish.

Length, 13 mm.

Described from Tranquebar. Schiner differentiates this species from his *sinensis*, which comes from China. Both are near *E. tenax*, L.

Type in Copenhagen Museum.

141. Eristalis basifemoratus, sp. nov. (Pl. III, fig. 21.)

♀ *Head*: eyes with dark brown pubescence on front part only, separated at base of antennæ by one-third the width of the head; frons slightly narrowing to vertex and face distinctly widening to lower margin of eyes; frons black, a little yellowish-grey tomentum on lower part; vertex with long blackish-brown hairs; rest of frons with bright yellow pubescence; extreme anterior margin brown; face with yellowish-grey tomentum and bright yellow pubescence, except on a rather broad, shining black, bare, median stripe; lower part of face also black. Face bluntly and strongly produced forwards and downwards in front, but descending only slightly below eyes themselves in profile. Antennæ blackish, arista brown, plumose on basal half. Occiput blackish-grey with whitish side margins and very short concolorous hairs; the usual dark brownish-yellow, long pubescence on upper margin, and longer, softer, yellow pubescence on lower margin. *Thorax* dull blackish, sides similar, scutellum brownish-yellow, both wholly covered with dense brownish-yellow pubescence. *Abdomen* black; a large orange-yellow triangular spot on each side margin of 2nd segment, extending from anterior to posterior border, but well separated in the middle line from each other; extreme hind margin of 4th segment yellowish. Pubescence (apparently) wholly yellowish; venter dark with some pale pubescence. *Legs* black; about basa

half of hind pair, and tips broadly of all pairs, of femora, orange; basal half of fore and hind tibiæ and basal three-fourths of middle tibiæ, first two joints of anterior tarsi (except tips), yellow. Pubescence of legs practically all yellow; some tiny black bristles on apical half of under side of hind femora. *Wings* pale grey, a slight brownish tinge about the stigmatic region and the "cross-veins"; halteres brownish-yellow.

Length, 11 mm.

Described from a single ♀, not in good condition, in the Indian Museum. No locality is affixed, but it is certainly from India, and the pale base of the hind femora stamps it as surely a distinct species. But for this latter character, and for the rather more produced epistome and the head descending relatively rather lower than the eyes themselves in profile, this form might be regarded as the ♀ of *quadristriatus*, Macq. The 3rd abdominal segment is obviously discoloured in the unique *type*, and may or may not resemble that of *quadristriatus*, Macq.

142. **Eristalis angustimarginalis**, sp. nov.

♂ ♀ *Head*: eyes closely contiguous for about half the distance from vertex to base of antennæ, with dense, short, dark brown pubescence; vertical triangle small, black, with black hairs; frontal triangle shining black, in centre with yellowish dust at sides, wholly covered with long black hairs. Face dull black, with black hairs in centre, grey-dusted and broadly covered at sides with

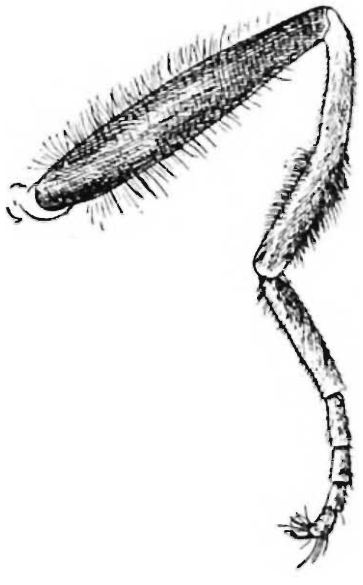

Fig. 36.—*Eristalis angustimarginalis*, sp. nov., hind leg, ♂.

short yellowish pubescence; central bump not prominent; lower part of head descending only slightly either below eyes themselves in profile or forwards, blackish, with very sparse, pale, short pubescence. Antennæ with 1st and 2nd joints black, 3rd dark brown, arista brown, strongly plumose on basal two-thirds. Occiput blackish-grey, with slightly silvery margin on lower half in certain

lights and with the usual occipital fringe of hairs, which is long and dark brown on upper margin, gradually disappearing towards sides, and yellowish on lower margin. In ♀, frons with parallel sides for a considerable distance from vertex, at which level it is about one-fifth width of head; wholly black with dense black pubescence; facial stripe a little more distinct than in ♂. *Thorax* dull blackish-brown with a distinct though dull, moderately wide, greyish band across suture and hind margin, and a less distinct one on anterior margin; sides dull yellowish-grey; scutellum bright brownish-yellow; the whole thorax and scutellum with dense brownish-yellow pubescence, with black hairs intermixed on darker parts of thorax and in centre of scutellum. *Abdomen* dark blackish-brown; 1st segment yellowish-white with concolorous hairs; 2nd segment with a pair of brownish-yellow spots, well-separated in middle line, elongate, transverse, narrow, with parallel edges except towards side margins, where they rapidly broaden to nearly the full width of the segment; 3rd with a similar pair of spots, but they are of uniform width throughout, not reaching side margins; 4th with a moderately shining, transverse æneous band, with parallel sides, across middle of segment; 5th wholly black; extreme hind margins of 2nd, 3rd and 4th segments orange-brown, bare; extreme anterior margin of 4th segment grey, quite bare. Pubescence of abdomen black except on anterior half of sides of 2nd, 3rd and 4th segments, where it is yellowish. Venter with about basal half yellowish, rest black, pubescence concolorous. *Legs* black, extreme tips of femora, basal half of all tibiæ, and first two joints of middle tarsi, orange-brown. Pubescence mainly yellowish, but black on femora except on upper side, and black on the black parts of hind tibiæ; also some black hairs intermixed on anterior tibiæ. *Wings* distinctly yellowish-grey; stigma reduced to a very small dark brown spot at tip of auxiliary vein; an indefinite darker brownish suffusion about centre of anterior half of wing.

Length, 14 mm.

Described from the *type* ♂ in the Indian Museum from Takepum Mt., Chinese Frontier, N.E. Burma, 4000–5000 ft., xi. 1910 (*C. W. Beebe*); and the *type* ♀ in the Pusa collection from Shillong, ix. 1918 (*Fletcher*). A ♂ in the British Museum is from the lower ranges, N. Khasi Hills, 1878 (*A. Chennell*). This species bears a great resemblance to *simulatus*, sp. nov., under which comparative notes are given.

143. **Eristalis simulatus**, sp. nov. (Pl. IV, fig. 1.)

♂ ♀ *Head*: in ♂, eyes with pale yellowish pubescence and an additional longitudinal stripe of dense dark brown pubescence as in *E. himalayensis*, closely contiguous for short space only (less than a quarter of distance from vertex to base of antennæ), thence abruptly and widely separated above and below, leaving an equilateral vertical triangle, black, with brown or ruby-red ocelli and long black hairs. Frons and face moderately shining black with

yellowish tomentum and concolorous pubescence, leaving antennal prominence bare of tomentum and with long black pubescence, extreme anterior margin brown. Lower part of head and a broad median stripe on face also practically bare; former not descending below level of eyes in absolute profile, but projected very considerably forwards and downwards in a prominent blunt cone about as far distally as tip of antennæ. Antennæ with first two joints black, 3rd dark brown, arista brown, subplumose on less than basal half. Occiput yellowish-grey; upper margin with long brownish-yellow hairs, with some black hairs intermixed; lower margin with yellowish pubescence; side margins with the pubescence very short. In ♀, face at level of antennæ about one-third of head; frons and face gradually widening above and below respectively; former black but broadly greyish-tomentose at sides on

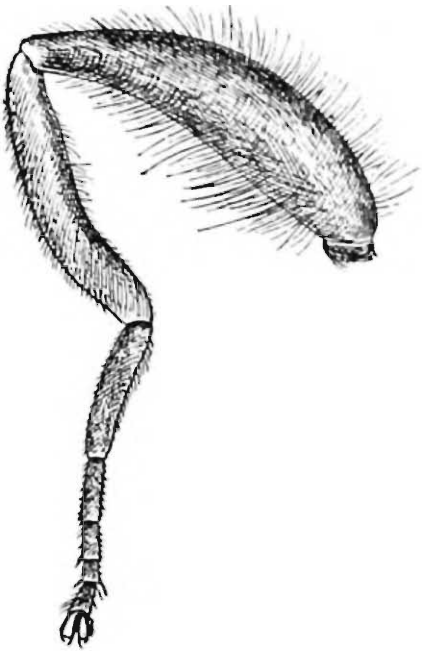

Fig. 37.—*Eristalis simulatus*, sp. nov., hind leg, ♂.

lower part and across the middle, the whole frons with black hairs; rest as in ♂. *Thorax* blackish, with a barely obvious greyish band along suture; anterior margin with a tinge of greyness; sides of thorax grey, scutellum brownish-yellow; pubescence of thorax and sides yellowish-grey; that on dorsum with black hairs freely intermixed; that on scutellum all black except for a fringe of long pale yellow hairs on hind margin. *Abdomen*: 1st segment ash-grey with pale yellow pubescence; rest of abdomen black with yellow marks; 2nd segment with a pair of transverse yellowish spots across middle, distinctly separated in the middle line, with parallel edges, suddenly widened towards side margins, where they encroach distinctly on the anterior margin but do not extend to hind margin; 3rd segment with a pair of transverse, narrow, yellowish spots across middle, touching side margins; hind margins of 2nd, 3rd and 4th segments narrowly brownish-yellow, quite bare. Pubescence generally

concolorous with ground-colour, but wholly brownish-yellow along sides. Venter dark grey or blackish, with pale, rather sparse pubescence. *Legs* black; extreme tips of anterior femora, about basal half of anterior tibiæ and the anterior tarsi more or less at the base, brownish-yellow. Pubescence of legs mainly yellow, but black, dense and shorter on front and upper sides of anterior femora, and some rather dense black pubescence is present on lower sides of hind femora; tibiæ with more or less black hairs intermixed, and a fringe of rather coarse black hairs on inner side of basal half; apparently the black hairs are more numerous in ♂ than ♀. *Wings* pale yellowish-grey; just a suspicion of brownish-yellow suffusion in middle of anterior part of wing; stigma reduced to a minute spot; halteres yellowish-brown.

Length, 12 mm.

Described from some ♂ ♂ and ♀ ♀ in the Pusa collection from Ootacamund, 7500 ft., 24–31.xii.1913 (*Fletcher*). *Type* ♂ and ♀ sent to British Museum.

E. angustimarginalis and *E. simulatus* closely resemble each other. The differences are as follows. In the former, the epistome is obtuse, not projecting beyond the antennal prominence in profile and produced downwards only to a distance of half the height of the eyes; the hind femora are straight and in no way thicker than the others; and the hind tibiæ are only gently curved. In *simulatus* the epistome is conspicuously conical, projecting diagonally much beyond the antennal prominence in profile, and is distinctly longer proportionately than in *angustimarginalis*; the hind femora are considerally incrassated and curved, though less so in the ♀; and the hind tibiæ are rather abruptly bent in the middle, rather less so in the ♀ *E. simulatus* is also rather smaller than its allied congener.

144. **Eristalis arbustorum**, *L.*

Musca arbustorum, Linnæus, Syst. Nat. Ed. 10, p. 591 (1758).
? *Musca paralleli*, Harris, Expos. Engl. Ins. p. 58, pl. xv, fig. 10 (1782).
? *Musca lineolæ*, id., op. cit. p. 43, pl. x (1782).

♂ ♀ *Head*: ♂, frons and face with yellowish-grey dust; vertex blackish with black pubescence and a little yellow pubescence on hinder part; frons with deeper yellow, and face with pale yellow, pubescence; region of mouth-border free of pubescence but not of yellowish-grey dust. The small antennal prominence shining black, orange-brown in front. Antennæ black, arista orange, plumose on basal half. Only a vestige of a median facial line; lower part of head shining brown, bare; occiput pale grey, silvery-white on side margins; upper part with yellow pubescence, lower with whitish. In ♀, pubescence on frons and face longer than in ♂, whitish-yellow, except for some black pubescence near vertex. *Thorax* dull blackish, sometimes indistinctly striped, covered with dense brownish-yellow

pubescence; scutellum brownish-orange with brownish-yellow pubescence. *Abdomen* orange-yellow; 2nd segment with a large black spot filling half anterior margin, cut away triangularly on each side and not reaching hind margin, its hinder part less broad than the front part; 3rd segment with a black spot reaching from anterior margin, of which it fills the centre third, gradually widening till it nearly attains hind margin, which latter is narrowly orange; also generally with a more or less distinct bluish cross-band; 4th and 5th segments shining black, 4th bluish-tinged, with hind margin narrowly orange. Pubescence of abdomen all pale yellow, rather dense and long, paler towards tips and on venter. In ♀, abdomen black, a large triangular orange-yellow spot on each side of 2nd segment; hind margins of 2nd, 3rd and 4th segments from orange-yellow to yellowish-grey. *Legs* black; tips of femora, basal two-thirds of anterior, basal half of hind tibiæ, also middle metatarsi, orange. Pubescence mainly pale yellowish; hind tibiæ with some black pubescence on apical half and on under side beyond the middle. *Wings* nearly clear, a little yellowish at base and in front; stigma small, brownish; halteres and squamæ yellow.

Length, 9–11 mm.

The above description is mainly from Verrall's account of British specimens, as I have seen only one specimen from British India, a ♀ from Kashmir, 1915 (*Pease*), in the Indian Museum; but there can be no doubt of its identity. The species should not be rare in the Western Himalayas, considering that it is probably the commonest in Europe after *tenax*; yet I have not met with it either in India, China or Japan. It has been recorded from North Persia, Siberia, and North Africa. The extent of the yellow in the abdomen is variable to some degree.

145. **Eristalis polychromatus**, sp. nov. (Pl. IV, fig. 5.)

♂ ♀. *Head*: eyes finely pubescent on upper part, closely contiguous for fully one-third of the distance from vertex to base of antennæ, reddish-brown with small darker spots; vertical triangle small, fully occupied by the ocellar prominence, which bears dark red ocelli and blackish-brown hairs; frontal triangle shining blue-black with dark brown hairs and narrowly brown anterior margin; side margins of frons narrowly dusted with yellowish-grey. Antennæ brownish-orange, arista bare. Face shining blue-black, with side margins dusted with yellowish-grey, and with a little yellowish-grey pubescence on lower half, except on the broad median black stripe, the moderately prominent, bare central bump and the narrow cheeks and mouth-border. Occiput grey-dusted, upper margin with a little dark brown, lower one with whitish-grey, pubescence. *Thorax*: dorsum with yellowish-grey tomentum and four shining black, almost equally broad, longitudinal stripes from anterior to hind margin, the median two rather

close together, probably sometimes united; dorsum with brownish-yellow pubescence; scutellum shining blue-black with dark brown pubescence. Sides of thorax æneous with a little yellowish-grey tomentum below humeri and some pale pubescence here and there. *Abdomen*: 1st segment yellowish, more or less æneous in middle; 2nd, 3rd and 4th orange; 2nd with hind margin and median stripe both narrow and shining black; 3rd and 4th with narrower black hind margin and traces of median stripe as on 3rd; 5th entirely shining black. Pubescence of abdomen pale yellow, but black on the black parts of 2nd segment and also towards the yellow sides of the segment. Venter pale yellow with concolorous pubescence. *Legs* black; anterior femora broadly, hind pair very narrowly at tips, orange; basal half of fore tibiæ, nearly all the middle pair, and base of hind tibiæ narrowly, orange; tarsi with 1st and 2nd joints and base of 3rd, orange. Pubescence of legs following ground-colour, but some brownish-yellow pubescence on hind femora. *Wings* nearly clear, a slight brownish tinge on anterior part and two minute brown spots in stigmatic region as in some other species; halteres orange.

Length, 5–6 mm.

Described from the *type* ♂ in the Indian Museum, from Calcutta (undated). An unsatisfactory species, of which the limits are by no means clear. The material consists of a ♂ (*type*) in the Indian Museum so named (but not described) by Bigot, and two further ♂ ♂ in very bad condition in Bigot's own collection, which, judging from the Indian Museum registered numbers that they bear, evidently form part of the same series. They are all labelled simply "Calcutta." Of these latter two ♂ ♂, one is an exact counterpart of the type, but the other does not appear to be conspecific. A ♀ from Katihar, Purneah District, 15. vi. 1907 (*Paiva*), may belong to this species. It has the frons and face gradually widening, at level of antennæ nearly $\frac{1}{3}$ width of head; frons shining black, with brownish-yellow hairs; the abdominal black bands and dorsal stripe are broader, the front part of the mesopleura and upper part of the sternopleura are grey-dusted. A ♀ in the British Museum from Dawnat Range, Tenasserim, 500–1500 ft., v–vi. 1894 (*Bingham*), may be conspecific, but is much larger (10 mm.).

146. **Eristalis arvorum**, *Fabr.* (Pl. IV, figs. 6, 7.)

Syrphus arvorum, Fabricius, Mant. Ins. p. 335 (1787).
Eristalis arvorum, de Meijere, Tijd. v. Ent. li, p. 247 (1908).
Eristalis fulvipes, Macquart, Dipt. Exot., Suppl. i, p. 128 (1846).
Eristalis antidotus, Walker, List Dipt. Brit. Mus. iii, p. 626 (1849).
Eristalis anticetus, Walker, List Dipt. Brit. Mus. iii, p. 624 (1849).
Syrphus quadrilineatus, Fabricius, op. cit. p. 336 (1787).
Musca tranquebarica, Gmelin, Syst. Nat. v, p. 2870 (1790).

♂ ♀ *Head*: ♂, eyes closely contiguous for much more than half the distance from extreme vertex to anterior edge of the

scarcely conspicuous antennal prominence; upper half of eyes with much larger facets and short, rather dense, dark brown pubescence, lower part of eyes bare, facets very small and with small dark spots. Vertical triangle rather small, black with black pubescence; ocelli large, orange to red, very prominent. Frons and face wholly covered with close yellowish-grey tomentum, former with long black pubescence, latter with short pale yellow pubescence; mouth-opening brownish-orange; cheeks very small, covered with yellowish-grey dust. Occiput grey, with pale yellow pubescence on lower part, dying away behind middle of eyes; a few short black hairs behind vertex. Antennæ bright orange, tip of 3rd joint a little darker; arista orange, bare, tip black. In ♀, frons and face widening distinctly from top to bottom, at level of antennæ one-third width of head; frons with black pubescence (shorter than in ♂) down to base of antennæ. *Thorax*: dorsum and pleuræ wholly covered with yellowish-grey dust; dorsum with four very conspicuous, equidistant, shining black, moderately narrow stripes from anterior to hind margin, the outer ones narrowed behind. Dorsum (including black stripes), pleuræ and the brownish-yellow scutellum with dense yellow pubescence; centre of scutellum with conspicuous black pubescence. In ♀, ground-colour of dorsum often more greyish. *Abdomen* technically black; 1st segment pale yellow; 2nd with two large, oblong, yellow spots practically filling the whole surface except (1) narrowly along anterior margin towards sides; and (2) on the side margins except just beyond middle, where the spot joins the yellow venter; and (3) more or less broadly on the hind margin, from which latter a narrow median line ascends nearly or quite to the anterior margin of the segment. In some specimens the 2nd segment is practically entirely yellow. 3rd segment with a pair of large oval, oblong, or diamond-shaped spots placed a little obliquely from middle of anterior margin (narrowly separated from each other) to middle of side margins, but often spreading over anterior corners of segment or nearly filling whole surface, perhaps leaving an indistinct median line and traces of a blackish hind margin. 4th segment dead-black, with a curved bright yellow spot, convex side forward, attenuated in middle (occasionally interrupted there and in that case forming two small oblong spots), reaching across middle of segment, just touching anterior margin; anterior corners and hind margin of segment shining black; sometimes there are, instead of a band, a pair of large, well-defined, obliquely placed, pale yellow spots, the ground-colour of the segment being brownish-orange instead of black. Pubescence of abdomen mainly following ground-colour, longer on 2nd segment and the whole of the margin, practically all yellow on 4th segment. Venter mainly yellowish on anterior half, blackish on remainder, pubescence sparse, pale yellow. In ♀, 1st segment of abdomen pale yellow; 2nd with a transverse curved yellow band just below anterior margin, broadening at sides, sometimes taking the form of two elongate spots, rounded and rather narrower at their inner ends, narrowly separated, but filling all side margins

except behind. Pubescence in ♀ much sparser. *Legs* brownish-yellow or orange; front tibiæ on apical half, middle tibiæ also but less distinctly, and hind pair wholly except narrowly at base, blackish; tarsi a little browner at tips. Pubescence of femora pale yellow, inner, outer and under sides of front pair with short, stiff, black pubescence; middle pair with at most some short black pubescence below, at or beyond middle; hind pair with black pubescence above and below at tip. Fore tibiæ with black pubescence on black parts and a fringe of black hairs down front side except at base; middle pair with a little black pubescence on black parts; hind pair with mainly black pubescence, but some pale yellow hair on anterior side at base. Tarsi all orange with pale yellow pubescence. Hind femora in ♀ with an indistinct, more or less broad, median band. *Wings* nearly clear; costa pale yellow with a minute blackish-brown dot at each end; subcostal cell sometimes pale yellowish; halteres yellow.

Length, 10–12 mm.

Described from a considerable number of both sexes from various sources. It is very common apparently all over India, in hills and plains, and occurs probably in all parts of the Orient. The actual dates recorded run from March to October, but in Java at least it seems to occur during the winter also. Originally described from China. The *types* of *anticetus*, Walk., and *antidotus*, Walk. (both males, from China), in the British Museum, are undoubtedly normal *arvorum*. As noted years ago in manuscript by Major Austen, a ♂ of *fulvipes*, Macq., in the Bigot collection is identical, and agrees with Macquart's description.

147. **Eristalis quinquelineatus**, *Fabr.*, var. **orientalis**, var. nov. (Pl. IV, figs. 8–10.)

Syrphus quinquelineatus, Fabricius, Spec. Ins. ii, p. 425 (1781); id., Syst. Antliat. p. 239 (1805).
Eristalis quinquelineatus, Wiedemann, Auss. Zweifl. ii, p. 185 (1830); de Meijere, Tijd. v. Ent. li, p. 245 (1908).
Eristalomyia paria, Bigot, Ann. Soc. Ent. France, (5) x, p. 218 (1880).
Eristalomyia zebrina, id., t. c. p. 222 (1880).

♂ ♀. *Head*: in ♂, eyes bronze-brown, with rather dense dark brown pubescence on upper and front parts, and six narrow, irregularly outlined but approximately parallel, longitudinal dark stripes; closely contiguous for nearly one-third of the distance from vertex to base of antennæ; vertical triangle equilateral, black with black hairs; frontal triangle with greyish-yellow tomentum, a little whitish towards sides and blackish in middle, covered with long blackish-brown hairs; extreme anterior margin yellowish-brown. Face moderately and obtusely produced, with grey tomentum and whitish pubescence; central bump rather small, obtuse, shining black, bare, the colour prolonged slightly upwards into a short median stripe. A nearly straight, moderately broad, longitudinal, shining black, bare stripe, pointed at upper

end, on each side of the central bump, extending nearly from base of antennæ to just below level of central bump, below which latter is a transverse, very narrow, black line extending across the face nearly from eye to eye, with a second similar line just above the mouth-opening. Lower part of head not or scarcely produced below eyes themselves in profile. Antennæ dark brown, lower part of 3rd joint and the arista orange, bare. Occiput with moderately dark grey tomentum, and some short grey pubescence, which is longest behind the vertex, where it is yellowish, and on the under side, where it is whitish. In ♀, frons about one-third of the head at level of antennæ; latter nearly black; rest as in ♂ *Thorax* yellowish-grey with concolorous pubescence; dorsum with four approximately equal and equidistant, comparatively dull, black stripes, the outer ones more pointed at each end; all the stripes attaining anterior margin or nearly so, but not attaining hind margin; the two middle ones still more abbreviated behind; at their hind extremity the ground-colour often has a golden or bronze tint; pleuræ often with a more or less æneous tinge. Scutellum brownish-yellow, somewhat translucent, with concolorous pubescence and a few brown hairs in the centre; about anterior half darker than the remainder. *Abdomen* black or blackish, a little shining, with a more or less æneous tinge. In ♂, 1st segment dull yellowish, a little shining; 2nd brownish-yellow, anterior and posterior margins blackish, the blackish colour on each margin extended in middle in the form of an irregular triangular spot, so that the two triangular spots nearly meet each other; across middle of segment, a pale yellowish narrow band of uniform width, except that the middle of its hinder side is a little excised by the large black spot on the hind margin; 3rd segment a little yellowish-brown on anterior half, with a pale yellowish band like that on 2nd segment, but not excised on hinder side; 4th segment with a narrow curved line extending nearly from side to side; 5th segment very small, entirely black. In ♀, abdomen darker, the black colour more extensive; 4th segment with the transverse curved band as in ♂; 5th segment larger than in ♂ and with a similar though smaller curved band. Pubescence of abdomen following ground-colour, but wholly pale yellow at sides. Venter yellowish with soft yellowish-grey pubescence; tip of abdomen more or less blackish. *Legs* mainly black or blackish-brown; anterior femora rather narrowly orange at tips (distinctly less than a fourth); hind femora pale at extreme tip only, sometimes barely perceptibly so; front tibiæ pale on basal half, middle pair nearly to tips, hind pair narrowly at base; first two joints of middle and hind tarsi pale. Pubescence of legs mainly yellowish-grey, but black on hind tibiæ. *Wings* nearly clear; stigma very pale yellow, small, its inner end with a minute dark brown spot at tip of auxiliary vein.

Length, 10–12 mm.

Described from a short series of both sexes in the Indian Museum and elsewhere. Kasauli, 6300 ft., 13 & 15. v. 1908;

Theog, 1. v. 1907; Phagu, 9000 ft., 18–21. v. 1916; Simla, 7000 ft., 16. v. 1909 (all the foregoing in the Simla District, collected by *Annandale & Nurse*); Naini Tal, 6000–7000 ft., 1908 (*Lloyd*); Kousanie, Kumaon District, 6075 ft., vii. 1914 (*Tytler*); Kurseong, 5000 ft., 6. vii. 1908 (*Annandale*); Sureil, 11–13. x. 1917 (*Annandale & Gravely*); Bijnor, Unit. Prov., 15–22. i. 1907; Mysore, 4400 ft., 25. iii–29. iv. 1913 (*Fletcher*); Ootacamund, S. India, 20–31. xii. 1912 (*Fletcher*); Yercaud, S. India, 4500 ft., 21. iv–4. v. 1913.

E. quinquelineatus, F., is recorded from South Europe, Africa, India, Ceylon and Java. It is readily distinguished from all others in the group of species round *arvorum*, F., by the striped eyes, the equally conspicuous median black facial stripe, and to a less extent by the shining black bare stripe on each side of the face. The latter character is present in *obscuritarsis*, de Meij., but to a much less extent, often being nearly or entirely absent, whilst the median facial stripe is in that species confined to the small central bump only. *E. quinquelineatus* appears to be variable in the relative extent of black and yellow on the abdomen. The arcuate whitish band (usually present in several Indian species) on the 2nd, 3rd and 4th abdominal segments is apparently normally absent on the 2nd segment in African specimens, though occasionally it is more or less indistinctly discernible, but it is nearly always present in Indian examples. The 2nd segment is narrowly margined with black, and is dusted with whitish at the base in African specimens, whilst in Indian ones the black margin is absent and the whitish dust replaced by a distinct cupreous tinge. The African form has the spaces between the stripes on the eyes spotted, which is not the case in Indian specimens, except occasionally and only towards the margins. The eye-stripes are normally three or four in number, in addition to the usually dark inner and hind margins, but the number is variable; I have seen a specimen with five complete dark stripes in addition to the inner and hind margins. The British Museum contains a long series of the African, *i. e.* the normal, form, showing considerable variability in most characters.

Eristalomyia paria, Bigot, is represented in the Bigot collection by three specimens in very bad condition, but their characters are sufficiently clear to prove it synonymous with *Eristalis quinquelineatus*. One ♀ is labelled "Ceylon," the other two (one headless, the head of the other crushed) bear no data. Bigot's description was drawn up from a ♂, and fits the insect very badly. An examination of his *Eristalomyia zebrina* shows that this also is synonymous with *quinquelineatus*. In the Catalogue of Kertész, *ridens*, Walk., is placed as another possible synonym, but it cannot be so; for though the type of it (not now being in the British Museum) is probably lost, seven examples (♂ ♀) in the British Museum from China and Corea are identified (probably correctly) as *E. ridens*, which I consider to be synonymous with *E. taphicus*, Wied. *E. fasciatus*, Meigen, is also given

in the Kertész Catalogue as a synonym of *quinquelineatus*, but as Meigen states that its eyes are spotted, it is more probably synonymous with *E. quinquestriatus*, F. *E. tabanoides*, Jaenn., seems to be quite a distinct species.

148. **Eristalis tæniops**, *Wied.*

Eristalis tæniops, Wiedemann, Zool. Mag. i, p. 2 (1818); id., Auss. Zweifl. ii, p. 182 (1830).
Eristalis fasciata, Loew in Germar, Faun. Ins. Europ. xxiii, pl. xxiii, ♀ (1841).
Eristalis torridus, Walker, List Dipt. Brit. Mus. iii, p. 612 (1849).
Eristalis ægyptius, Walker, op. cit. p. 621 (1849).
Eristalis communis, Adams, Kansas Univ. Sci. Bull. iii, p. 162 (1905).
Eristalodes tæniopus, Mik, Wien. Ent. Zeit. xvi, p. 114 (1897).
? *Eristalis punctifer*, Walker, Entom. v, p. 274 (1871).
Helophilus pulchriceps, Wiedemann in Meigen, Syst. Beschr. iii, p. 375 (1822).

♂ ♀ *Head*: eyes coffee-brown to dark red-brown; pubescence on upper part only, with five longitudinal darker stripes, also generally the inner and hind margins darker; vertical triangle æneous-black, with dark brown pubescence. Frons and face with yellowish-grey dust and concolorous pubescence, becoming darker towards upper part of frons, extreme front margin of latter brownish-orange. Antennæ blackish, under side of 3rd joint often more or less orange, arista orange, bare. Face moderately produced; a median, narrow, shining black stripe, and a more or less distinct similar, shorter stripe on each side of it, as in *quinquelineatus*, F., though generally less conspicuous; cheeks æneous, more or less greyish-dusted, but generally leaving a bare black stripe. Occiput dusted with ash-grey, with a little white pubescence below. *Thorax*: ground-colour composed of four dull blackish, not easily distinguishable, nearly contiguous stripes, the two median ones generally not reaching hind margin, these stripes placed on a little lighter yellowish-grey dorsum, the whole surface covered with rather dense brownish-yellow pubescence. Pleuræ dull æneous-black, with similar pubescence. Scutellum yellowish, rather shining, indistinctly blackish in middle; some black hairs intermixed with the brown-yellowish pubescence. *Abdomen*: 1st segment very short, more or less æneous, 2nd and 3rd mainly orange or orange-yellow; anterior margin of 2nd narrowly black, hind margin broadly so and the black colour extended in middle to a varying distance up to middle of segment; 3rd segment similar, but the black on hinder half more extensive, often forming a more or less obvious median black stripe, the anterior margin black only for a short distance in the middle; 4th segment in ♀ similar to 3rd, 4th in ♂ and 5th in ♀ wholly black. A more or less obvious, white-dusted, arcuate band across middle of 3rd and 4th segments, and in ♀ across middle of 5th also. Extreme hind margins of 2nd and 3rd in ♂, and of 2nd, 3rd and 4th in ♀, narrowly shining æneous. Pubescence of abdomen all yellowish.

Venter orange, tip and traces of a median stripe black. *Legs* mainly blackish or dark brown; tips of anterior femora rather broadly, of hind pair narrowly, orange or yellowish; front tibiæ on about basal half, middle pair nearly wholly and base of hind pair narrowly, orange or yellowish. Tarsi blackish-brown, generally about two basal joints orange. Pubescence of legs mainly yellowish or whitish, darker on tips of tarsi. *Wings* almost colourless; stigma pale brownish-yellow, its inner end deeper and well marked; halteres yellowish.

Length, 10–12 mm.

Described from a ♂ from Peshin (iv. 1903) and a ♀, Quetta (v. 1903), both taken by Col. Nurse; and from a long series of both sexes in the British Museum, from localities ranging from the Canary Islands, through Abyssinia to Khartoum, Rhodesia, the Transvaal and Natal. The specimens from the Indian localities have a more greyish or dusty appearance than the more normal South African ones. The species is also tolerably common round the shores of the Mediterranean, and recorded from Asia Minor and Arabia.

Type in Wiedemann's collection.

149. **Eristalis quinquestriatus**, *Fabr.* (Pl. IV, figs. 11–14.)

Syrphus quinquestriatus, Fabricius, Ent. Syst. iv, p. 289 (1794); id., Syst. Antliat. p. 245 (1805).
Eristalis quinquestriatus, Wiedemann, Auss. Zweifl. ii, p. 187 (1830); de Meijere, Tijd. v. Ent. li, p. 245 (1908).
Eristalis æsepus, Walker, List Dipt. Brit. Mus. iii, p. 625 (1849).
Eristalis quinquevittatus, Macquart, Explor. Algérie, Zool. iii, p. 465, pl. iv, fig. 10 (1849).
Eristalomyia picta, Bigot, Ann. Soc. Ent. France, (5) x, p. 219 (1880).
Syrphus megacephalus, Rossi, Mant. Ins. ii, p. 63, pl. v, fig. L (1794).

♂ ♀ *Head* in ♂ with eyes unstriped but with minute black spots, especially on under side; contiguous for a little greater distance than in *quinquelineatus*, F., finely and shortly pubescent on upper and front part; the vertical triangle smaller. Frons and face with yellowish-grey tomentum (except on the face just below antennæ, where it is whitish) and concolorous pubescence, but in some specimens some brown hairs occur on upper part of frons. No median stripe, but extreme anterior edge of central bump narrowly black, with a *very* narrow stripe (almost a trace only) on each side, curved on upper part; lower part of head as in *quinquelineatus*, but distinctly less prominent. Antennæ and bare arista all brownish-orange, tip of 3rd joint narrowly blackish; rest as in *quinquelineatus* ♂ In ♀, frons one-third of head at base of antennæ; eyes more spotted than in ♂ and bare throughout, except for a very little pubescence on upper side; frons blackish towards vertex, and with a brownish irregular transverse band just above middle; the whole frons with dark brown hairs; rest as in ♂ *Thorax* much as in *quinquelineatus*, but dorsum much more yellowish and the black stripes very shining; pubescence very fine,

less obvious when seen from above than in *quinquelineatus*. Dorsum in ♀ (apparently) more whitish-grey in ground-colour. *Abdomen*: 1st and 2nd segments yellowish, latter with a rather broad black band on hind margin, enlarged triangularly in middle, where it extends forward beyond centre of segment; 3rd segment yellowish with a similar black band (in some cases broader than that of 2nd segment) and an irregularly shaped black spot on middle of anterior margin; 4th segment shining black with a curved, dull yellow, transverse band with parallel sides (sometimes in the shape of a wide open inverted **V**) across centre of segment, its upper part generally touching anterior margin of segment; in some specimens this band is faintly present, though narrower, on 3rd segment also; extreme margins of 2nd and 3rd segments, and also the part of 4th segment posterior to the yellow cross-band, more shining than the other black parts of the abdomen. In ♀, the yellow parts on 2nd and 3rd segments often more uniformly wide than in ♂; the yellowish-white band on 3rd and 4th segments straighter, and a similar though smaller band on the 5th segment. Pubescence of abdomen almost wholly pale yellow, but blackish-brown on black parts of 2nd segment; in some specimens the pubescence of the 3rd segment is also a little brownish. Venter as in *quinquelineatus*. *Legs* much as in *quinquelineatus*, but anterior femora with more black pubescence on upper, lower and inner sides; all tarsi with 1st and 2nd joints wholly, 3rd basally, yellowish. *Wings* as in *quinquelineatus*.

Length, 8–9 mm.

Described from several of each sex in the Indian Museum and Pusa collections. Kousanie, Kumaon District, 6035 ft., vii. 1914 (*Tytler*); Katmandu, Nepal; Sukna, base of Darjiling Himalayas, 2. vii. 1908 (*Annandale*); Calcutta, 18. ix. 1907; Jubbulpore, 1. ix. 1907 (*Nurse*); Bangalore (*Cameron*); Madhupur, Bengal, 16. x. 1909 (*Paiva*); Cheria Is., Chilka Lake, Orissa, 21. vii. 1914; Mangaldai, Assam, 16–18. x. 1910 (*Kemp*); Semarang, viii. 1905 (*Jacobson*); Sibolga, Sumatra (*teste de Meijere*).

Though closely resembling *quinquelineatus*, F., the present species is distinguished by the absence of dark stripes on the eyes. The narrow, bare, shining black stripes on the face are much reduced or absent, and the median facial stripe is also absent or reduced to a trace only; the thoracic dorsum is more yellowish (♂) or whitish (♀), and the stripes blacker and very shining; there is more yellow in the 2nd and 3rd abdominal segments, and the tarsi are more yellowish.

E. quinquevittatus, Macq., is probably synonymous with *quinquestriatus*, F., as it is said to have the eyes spotted. No special mention is made by Macquart of the colour of the hind tarsi: from the coloured plate these appear to be dark, which might make de Meijere's *obscuritarsis* a synonym of Macquart's *quinquevittatus*; but judging by the breadth of the abdomen the latter is probably merely a synonym of the common *E. quinquestriatus*, Fabr. *Syrphus megacephalus*, Rossi, is evidently synonymous with *E. quin-*

questriatus, and was described in the same year. I have accepted the latter name, as Dr. de Meijere has adopted it. *Eristalomyia picta*, Big., represented by the solitary ♂ *type* in very bad condition, is undoubtedly also this species. The thorax is largely black owing to the very narrow interstices between the longitudinal stripes, otherwise the specimen exhibits no variation from the typical form.

150. **Eristalis tabanoides**, *Jaenn.*

Eristalis tabanoides, Jaennicke, Abh. Senckenb. Naturf. Ges. vi, p. 402, pl. xliv, fig. 4 (1867); Becker, Mitt. Zool. Mus. Berlin, ii, p. 83 (1903); id., Zeitschr. Hym. Dipt. vii, p. 253 (1907).

♀ *Head* not produced below eyes; latter bare, spotted. Frons and face dusted with pale yellowish-grey, with concolorous pubescence which becomes whitish below antennæ; extreme front margin of frons orange. Antennæ brownish-orange, upper part of 3rd joint blackish, arista orange, bare. Occiput dusted with ash-grey, a little white pubescence below. *Thorax* wholly ash-grey; dorsum with four shining black stripes of the ordinary pattern, equidistant, moderately broad, all rather pointed in front and behind, the two median ones as long as the others. Hind corners of dorsum blackish. Scutellum dull orange, with brownish-yellow pubescence including some black hairs. *Abdomen* mainly black; 1st segment whitish, 2nd more or less yellowish, for a triangular space at sides; 2nd, 3rd and 4th segments with a moderately broad, arcuate, ash-grey band, its ends at the middle of each side, where it is rounded off, the band extending forward to the anterior margin on 3rd and 4th segments and sometimes almost interrupted in middle on 2nd segment. The black portion of each of these segments is divided into a dead-black arcuate band just below the ash-grey one, and the remainder which is æneous-black. 5th segment with basal half ash-grey, remainder shining black. Hind margins of 2nd, 3rd and 4th segments broadly æneous. Pubescence of abdomen whitish on the grey parts and black on the black parts. *Legs* black; coxæ dusted with ash-grey; tips of femora rather narrowly, basal half of fore tibiæ, two-thirds of middle pair and one-third of hind pair, yellowish. Tarsi blackish, middle pair orange on about basal half. Pubescence of legs whitish. *Wings* quite colourless; stigma pale brownish-yellow, a minute blackish-brown dot at each end; squamæ whitish, halteres orange.

Length, 10–11 mm.

Described from two ♀ ♀ from Quetta, vi. 1902 (*Col. Nurse*); and from others from various localities in Africa (Abyssinia, Gold Coast, British East Africa, Uganda, Nyassaland). The ♂ is still unknown. The species appears to me valid, although Bezzi (Syrphidæ of Ethiop. Reg. p. 84, 1915) thinks that it may possibly be a variety of *quinquestriatus*, F. (*quinquelineatus*, Bezzi, *nec* Fabr.). It was discovered in Massowah, and is recorded also from Tunis.

151. **Eristalis obscuritarsis**, *de Meij.* (Pl. IV, figs. 15–18.)

Eristalis obscuritarsis, de Meijere, Tijd. v. Ent. li, p. 250, ♂ ♀, pl. vii, figs. 19, 20, abdomen ♂ ♀ (1908).

♂ *Head*: eyes broadly contiguous, bare, except for a little sparse pubescence on upper part; black-spotted, upper facets only a little larger than lower; frontal triangle grey-dusted, black-haired, a shining black triangular space above base of antennæ; vertical triangle blackish-brown with black hair; pale hair on occipital margin; epistome dusted with greyish-white, with short whitish pubescence; central bump small, shining black; cheeks narrow, white-haired. Antennæ reddish-yellow, upper side darker; arista reddish-yellow, bare. *Thorax* shining black, with rather long yellowish hair; side margins broadly wax-yellow, in addition to three narrow, similarly coloured, longitudinal stripes which fade away posteriorly, not reaching hind margin. Scutellum honey-yellow; pleuræ metallic black, often obscured anteriorly by the grey dust. *Abdomen* dead-black with metallic blackish-green hind margins; on anterior segments the black colour is restricted through the very large yellow side spots; 1st segment with only yellow side spots; 2nd practically entirely occupied by the spots, except on middle part of anterior and hind margins and on irregular, median, black, moderately broad stripe; 3rd segment with a large yellowish quadrate spot on each anterior corner, these spots merging gradually hindwards in the brownish or blackish hinder part of the segment; a broad median black stripe and a yellowish curved band across middle of segment, not reaching sides; 4th segment black with a similar yellowish band; hind margins of 2nd, 3rd and 4th segments, also all 5th segment, shining black. *Legs* black; extreme tips of all femora yellow, also basal half of front tibiæ, middle tibiæ up to two-thirds, and hind tibiæ at base; tarsi black; middle metatarsi yellow to tips. Pubescence of legs, including that of hind tibiæ, yellow. *Wings* clear, stigma very indistinct; squamæ brownish-white with concolorous fringe; halteres yellow.

Length, 10 mm.

♀ Frons grey, whitish-dusted, rather marbled; a small shining black triangular mark immediately above antennæ; all pubescence of head black; the shining black spot, placed in front of the ocellar bump and sharply emarginate in the middle of its anterior margin, reaches in this species fairly far forward; close in front of this are three small brownish marks, the lateral one on each side close against the eye-margin. Thorax as in ♂, median stripe reaching scutellum. Abdomen dull black, the yellow spots smaller than in the ♂, with broad, shining æneous- or greenish-black hind margins, and with a curved yellowish-white band on each segment from the 2nd to the 5th, the convex side of the band near the anterior margin of the segment, the band narrower in the centre, not quite attaining side margins; 1st band narrowly interrupted.

Length, 8–10 mm.

Generally distributed in India from Kashmir to Bangalore and Chittagong, ii, iii, vii, x, xi, xii; Deesa, vi. 1897; vii. 1901 (*Nurse*). Dr. de Meijere described it from Singapore and Bombay.

This description is mainly a translation of de Meijere's, but that of the abdomen of both sexes is chiefly my own, drawn up from a large number of specimens in good condition.

Type in Amsterdam Museum.

E. obscuritarsis, de Meij., is very closely allied to *E. quinquestriatus*, Fabr., yet it is a perfectly distinct species, as is quite obvious when several specimens of each sex of both forms are placed side by side. In *quinquestriatus*, Fabr., ♂, the principal specific points appear to be as follows: (i) a small olive-brown spot on each eye-margin, about half-way between upper angle of frontal triangle and level of antennæ, or a trifle lower; (ii) a small black triangle (due to absence of tomentum) at about exact centre of frontal triangle, always isolated from the shining black antennal prominence, and with no tendency to form a longitudinal line; (iii) a small olive-brownish spot on each side of face, contiguous to eye-margin, a little below level of antennæ; (iv) central bump narrowly shining black, the colour carried narrowly upwards for a short distance as a fine line; (v) on each side of central bump, a very narrow black line (often indistinct in good specimens through density of tomentum), its upper part curved outwards a little; (vi) the abdominal 4th segment with the whitish band more like a broadly open inverted V; a similar band on 3rd segment, but narrower and less distinct; no band on 2nd segment. In the ♀ the normal frontal marks are as follows: (i) a pair of longitudinally placed, oblong, olive-brown or blackish spots on upper part of frons side by side, just below ocellar region; (ii) a little below these, two small spots, one on each side on the eye-margin, with a diamond-shaped spot between them, all three more or less connected by a faint brownish transverse line; (iii) below these, a small curved spot on each side, on or very near the eye-margin; (iv) a little above level of antennæ, two small roundish spots one on each side on or near the eye-margin, with a shining black triangular spot between them, placed a little above (but not joined to) the shining black triangular antennal prominence; (v) central bump and fine side lines as in ♂. Abdomen with bands on 2nd, 3rd and 4th segments all gently curved, that on 2nd often fainter and narrower.

In *obscuritarsis*, de Meij., ♂ (i) there are no small brown spots on eye-margins of frontal triangle; (ii) no isolated black spot in centre of frontal triangle, but a small one generally contiguous to, or very near, the black antennal prominence, and often more or less continued upwards as a fine black line; (iii) no definite side spots on face, but indistinct markings often present; (iv) and (v) as in *quinquestriatus*. It must be noted that in *obscuritarsis* the tomentum of the frons is more yellowish-grey, that of the face whitish, and the two colours are more sharply demarcated than in *quinquestriatus*. In the abdomen the white bands on the

3rd and 4th segments are about equally distinct and generally curved, not V-shaped. No band on 2nd segment. In the ♀ (i) the only definite mark on the frons is a large shining black diamond-shaped spot on its upper part, sometimes flattened on upper side; (ii) traces are present of the uppermost pair of spots as in *quinquestriatus*, or other indefinite marks; (iii) a fine line sometimes carried upwards from the black antennal triangle. In the abdomen the 2nd, 3rd and 4th segments have the white band very distinct.

152. Eristalis curvipes, *Schin.* *

Eristalis curvipes, Schiner, Novara Reise, Dipt., p. 363 (1868).

♂ ♀ *Head* yellow, epistome prominent, conical; central bump shining black, black-haired, a little prominent; median stripe and cheeks shining black; rest of head with whitish dust and pubescence. Antennæ blackish-brown, 3rd joint grey-dusted, arista shortly plumose; eyes sparsely pubescent, with a darker stripe above middle. In ♀, frons shining black, black-haired. *Thorax* black with fawn-yellow hair and a grey cross-band on suture; in front of scutellum, a similarly coloured, grey, shining spot; scutellum diaphanous yellow; pleuræ with yellowish-grey hairs. *Abdomen* shining black, 2nd segment with an elongated yellow triangular spot on each side on anterior margin, rather in the form of an elevated callosity, these spots narrowly separated from each other, hind margin of segment narrowly yellow; emarginations of 2nd and 3rd segments yellow; 3rd segment with a narrow yellow interrupted band across the middle; hind margin also yellow-bordered; 4th segment wholly black except the narrow yellow hind margin. *Legs* pitchy-brown; middle tibiæ and metatarsi reddish-yellow; hind femora very incrassate and curved, with thick, woolly, fawn-yellow hair on both sides; hind tibiæ so curved that in one part they appear broken, at which point there is a minute yellow spot, the tibiæ bearing long pubescence up to that point. In ♀, hind femora less incrassate and hind tibiæ less curved. *Wings* clear; veins a little tinged with brownish-yellow, especially in middle and on anterior border.

Length, 10 mm.

Described by Schiner from Ceylon. From the grey transverse cross-band on the suture it appears to be allied to *latus* and *suturalis*.

153. Eristalis latus, *Macq.*

Eristalis latus, Macquart, Dipt. Exot. ii, 2, p. 35, pl. viii, fig. 2 (1842).

♀. "Face black, with tawny tomentum and pubescence, central bump and lower part of cheeks bare. Frons black, with tawny tomentum and pubescence, bare at base and in the middle; vertex

* Redescribed in appendix from examples taken in Ceylon by Col. Yerbury.

with black pubescence. Antennæ black, arista brown, plumose. Eyes bare. Thorax with grey tomentum and tawny pubescence from anterior border up to the suture, remainder black, a little grey tomentum and tawny pubescence on hind border; scutellum black, large, marginate. Abdomen with tawny pubescence at sides; 1st segment blackish; 2nd dull black with a tawny spot towards each side; 3rd with a tawny band, emarginate in middle, on front margin; 4th with a small tawny spot on each side; 2nd, 3rd and 4th with metallic-green hind margins, broad on 3rd and 4th; 5th segment blue with green reflections. Venter black; 2nd segment tawny, with black hind margin; 3rd black, anterior margin tawny. *Legs* black, basal half of tibiæ yellow; tarsi brownish-tawny. (Hind legs missing.) Halteres brownish. *Wings* yellowish, anterior margin brown; veins infuscated with brown or brownish; 3rd vein with an appendix at the lowest point of the loop; 1st basal cell reaching to middle of discal cell; 3rd posterior cell with an appendix at the inner angle *.

"Locality unknown. In my collection."

Subsequently (Dipt. Exot., Suppl. i, p. 126, 1846) Macquart recorded another specimen which came from India.

154. **Eristalis suturalis**, sp. nov. (Pl. III, fig. 20.)

♂ ♀ *Head*: in ♂, eyes bare, or possibly with a little very short inconspicuous pubescence in front; frons shining black, with dense black pubescence; antennæ and basal region of antennæ dull brown, arista black, shortly plumose above and below for a short distance at base; face shining black, with inconspicuous greyish-white dust and a little short whitish pubescence; central bump moderately large, transverse, upper mouth-border slightly produced; occiput with short whitish hair on under side. In ♀, frons and face confined by straight but not parallel sides, gradually widening from vertex to mouth-opening. Frons at base of antennæ nearly one-third of the head, distinctly but not greatly narrowed at vertex; rather dull black, with a very short, narrow whitish streak (seen best from in front) on each eye-margin considerably below the middle, and with a slight greyish tinge on the inner side of the streak extending some little way across the frons. Whole frons with short, rather dense blackish-brown or wholly black pubescence; ocelli brownish-red to ruby-red. Tip of the frons bright shining brown. Face well cut away below antennæ, moderately prominent in middle, black, with yellowish-grey dust and short grey pubescence, this latter almost absent on the central bump; cheeks black, with yellowish-grey pubescence and dust; mouth-opening large, brown-bordered. Head descending

* Judging from Macquart's figures his "3rd posterior cell" is presumably the discal cell, at the lower angle of which a small appendix is affixed.

only slightly below eyes themselves in profile. Proboscis and antennæ blackish-brown, latter with yellowish-grey dust; arista brown, distinctly but not strongly plumose, on basal half; apical half black, bare. Eyes bare. Occiput blackish with black hairs above; lower margin silvery-white with snow-white hairs. *Thorax* blackish, a narrow, whitish-grey, ill-defined but obvious band immediately in front of suture, indistinct in middle; and a nearly æneous-grey, ill-defined band on hinder part of dorsum. Scutellum black, hind margin rather narrowly yellowish-brown. Dorsum of thorax and scutellum with moderately dense yellowish-brown pubescence; a bunch of bright yellow pubescence at each end of suture. Sides of thorax black with mainly yellow pubescence; sternopleura and a broad stripe thence to end of suture, ash-grey. *Abdomen* as broad as thorax, barely longer; 1st segment black; 2nd black with a large subtriangular yellowish spot on each side, attaining the anterior corner but not the hind corner, and the two spots well separated in centre of segment; 3rd and 4th dull æneous with an inverted, wide open, broad, velvet-black, **V**-shaped mark (its upper and lower edges parallel), not quite reaching anterior margin but attaining side margins on or near posterior border. Pubescence mainly bright yellow, short, but black on hinder part of 2nd and 3rd segments, and with some longer black hairs at tip of 4th segment; 5th segment blackish with a little yellow pubescence. Venter yellowish with yellow pubescence. *Legs* black or blackish-brown; tips of front coxæ and of the anterior femora narrowly, anterior tibiæ almost wholly, hind pair on basal half, and basal half of anterior tarsi (occasionally hind metatarsi also), yellowish. Pubescence of legs yellow except black on tips of tarsi. *Wings* clear; stigma very pale brown; halteres pale yellowish.

Length, 10–11 mm.

Described from a ♂ in inferior condition in the British Museum (*type*) from the Khasi Hills (*Sladen*), and 3 ♀♀ in Indian Museum: 30. vii. 1904, labelled "caught in hospital"; 31. vii. 1904, "caught in Kolasil"; the third specimen from above Tura, Garo Hills, Assam, 3500–3900 ft., Sept. 1917 (*type* ♀) (*Mrs. Kemp*). A short, thick-set, *Megaspis*-like species, yet undoubtedly an *Eristalis*; closely allied to *latus*, Macq., from which it appears to be specifically separated by the characters stated in the table of species. *E. latus* may possibly be a *Megaspis*, as Macquart notes the scutellum as broad, although in his figure it appears of normal size. He does not mention the wrinkled space on the frons.

155. Eristalis multifarius, *Walk.*

Eristalis multifarius, Walker, Ins. Saund., Dipt. i, p. 248 (1852); Osten-Sacken, Ann. Mus. Genova, xvi, p. 442 (1882).

♀. *Head*: eyes light reddish-brown, quite bare, with two very distinct black stripes on disc in addition to inner and hind border

dark. Frons with parallel sides for the greater part of its length, widening a little above antennæ, at level of which it forms nearly one-third the width of the head; frons and face moderately shining black, mainly covered with greyish-white dust but leaving vertex broadly black, also a transverse space across middle of frons; face widening gradually, rather prominent, with a rather short and narrow median shining black stripe, pointed at upper end; lower part of head bare of pubescence, with whitish dust only, with a shining black bare stripe on each side. Occiput dusted with ash-grey, with whitish pubescence on lower part. *Thorax* wholly ash-grey; four shining black stripes of the usual pattern, placed well clear of anterior and hind margins, the outer ones rather pointed behind; hind corners of dorsum forming a narrow shining black ridge, with stiff black hairs; pleuræ ash-grey. Scutellum entirely orange. Whole thoracic dorsum and scutellum with yellowish pubescence; pleuræ with whitish pubescence. *Abdomen*: 1st segment pale grey with whitish pubescence; 2nd mainly orange with anterior margin narrowly black except at corners, and with a transverse blackish band (not reaching sides) a little in front of hind margin; 3rd segment mainly orange, with a very large semicircular blackish spot on hinder half, this spot clear of hind margin and hind corners and not reaching anterior margin; 4th segment wholly black except narrowly orange on anterior corners; 5th segment wholly blackish; 2nd, 3rd and 4th segments with extreme hind margins pale yellow, and a fringe of pale yellow hairs. Pubescence of dorsum and sides whitish. Venter with basal half mainly orange, apical half black. *Legs*: coxæ and anterior legs black; tips of femora and basal half of fore tibiæ yellowish; middle tibiæ mainly yellowish, but more or less brownish on apical part; anterior tarsi blackish-brown, more or less orange at base, especially middle pair. Hind femora much incrassated, brownish-orange, tips broadly black; a black subapical ring, incomplete on outer side; hind tibiæ and tarsi black or blackish-brown. Pubescence of legs whitish, orange-yellow below hind tarsi. *Wings* very pale grey, very vitreous; 2nd longitudinal vein distinctly curved downward in a loop near tip; 3rd vein deeply looped; anterior cross-vein longer than usual, so that the submarginal cell is narrowed on basal part. Squamæ grey, with brown margins; halteres orange.

Length, 9 mm.

Described from the *type* ♀ in the British Museum from India, and another ♀ from the Lower Ranges, N. Khasi Hills, Assam, 1878 (*Chennell*); also from two ♀♀ taken by Col. Nurse at Deesa, vi. 1897, and Abu; and a ♀ from Coimbatore, S. India, 22. i. 1913. Recorded also from Java. The ♂ is not known. I do not think that this species should remain in *Eristalis*, on account of the greatly thickened hind femora; the dipped 2nd vein is an additional abnormality.

Genus **MEGASPIS**, *Macq.*

Megaspis, Macquart, Dipt. Exot. ii, 2, p. 27 (1842).

GENOTYPE, *Eristalis chrysopygus*, Wied., the first of the two species included in the genus by Macquart; by present designation.

The general characters are those of *Eristalis*. Head, thorax and abdomen about equally wide; whole body usually densely punctuate. *Head* hemispherical, large, a small, rather shallow pit on each side of face at lower corner of eye; a narrow band above upper mouth-edge, and a small space just below antennæ, smooth, impunctate; a small space above antennæ with wrinkled surface, usually visible below the pubescence; eyes bare; contiguous in ♂ for a long distance, upper facets larger than lower ones; frons in ♀ broad, nearly linear, slightly convex. Face barely cut away below base of antennæ, only moderately prominent, descending very little below the eyes in profile. Antennæ comparatively small, 3rd joint oblong-ovate, drooping, arista basal, bare, slightly or conspicuously plumose on both sides. *Thorax* thick, distinctly broader than long; with short dense pubescence, or bare except for the minute stiff hair set in each minute tubercle. Scutellum very large and broad, its vestiture as on thorax. *Abdomen* thick, as long as or slightly longer than thorax, obconical or with rounded tip, densely pubescent or tomentose. *Legs* comparatively short and weak; hind femora normally neither incrassate nor toothed, but with a distinct tooth in at least one species (*M. crassus*). *Wings* as in *Eristalis*; 3rd vein generally with a small appendix at lowest point of loop.

Range. South Asia, China, Japan; West and South Africa, Abyssinia.

This genus can usually be easily recognised from *Eristalis* by the peculiar small wrinkled space above the antennæ, which in perfect specimens requires careful looking for beneath the dense pubescence of the face. The species have a certain facies of their own, due to their short, thick, robust shape. They are few and readily distinguished. Some authors adopt *Phytomia*, Guérin, in place of *Megaspis*. Major Austen kindly informed me of the suggested change some years ago, but the claim of the former name does not seem *absolutely* certain, so I hesitate to accept the alteration.

Table of Species *.

1.	Hind femora with a conspicuous tooth below near tip.	*crassus*, Fabr., p. 197.
	Hind femora unarmed.	2.
2.	Arista bare	*errans*, Fabr., p. 199.
	Arista very distinctly plumose on basal half.	3.
3*a*.	Basal half of wing (or thereabouts) diagonally all black; abdomen with dense golden-yellow pubescence on last segment	*chrysopygus*, Wied., [p. 200.

* De Meijere gives some notes and a table of species, Tijd. v. Ent. li, pp. 240, 241 (1908).

3 *b*. Anterior half of wing dark brown, hinder half yellowish-grey (black species with broadly orange tomentose front margin of thorax; 2nd abdominal segment mainly deep orange) . . .. .. *æsymnus*, Walk., p. 200.

3 *c*. Basal half of wing not black, normally at most only (with central and anterior part also more or less) a little tawny-brown. 4.

4. Femora unicolorous, varying from light brown to blackish; hind pair never tawny on basal half and dark on apical half; thorax with a broad black transverse band across middle; wings brownish or yellowish about the middle and base .... *argyrocephalus*, Macq., [p. 201.

Femora wholly quite black; hind pair with short, stiff, bristly hair; thorax blackish, with pubescence close, black, yellowish or reddish anteriorly; wings nearly clear, a distinct blackish-brown suffusion in middle of anterior border, and to some extent at base *zonatus*, Fabr., p. 203.

156. **Megaspis crassus**, *Fabr.* (Pl. IV, fig. 19.)

Syrphus crassus, Fabricius, Mant. Ins. ii, p. 334 (1787).
Eristalis crassus, Wiedemann, Auss. Zweifl. ii, p. 153 (1830).
Dolichomerus crassus, Macquart, Dipt. Exot., Suppl. iv, p. 132, pl. xii, fig. 15 (1849).
Syrphus megacephalus, Fabricius, Ent. Syst. (Suppl.) p. 561 (1798).

♂ ♀ *Head* in ♂ black, frontal callus occupying greater part of frontal triangle, which latter bears blackish-brown pubescence; vertical triangle almost bare; eyes contiguous for a long space, upper facets considerably larger than lower ones; hind margin of eyes on lower half with silvery-white tomentum; a little white pubescence on lower part. Antennæ black, arista orange, plumose on basal half. In ♀, frons at vertex less than one-fifth, at level of antennæ barely one-third, width of head; frons and face together with straight sides, which do not diverge from top to bottom so much as in *chrysopygus*, but in all else as in *chrysopygus*. *Thorax* and scutellum shining black. *Abdomen* shining black, bare; 2nd, 3rd and 4th segments each with a rather deep impression of a large circle, its upper part placed on anterior margin; 2nd segment with a little snow-white tomentose pubescence on extreme anterior margin; 3rd and 4th segments with an oblique impressed line on each side on hinder half, and a yellowish-grey tomentose spot on anterior margin on each side of the circle; 4th segment with an additional spot on each side at the base of each oblique line, contiguous to the impressed circle. This circle, a broad spot on each side of anterior margin, and the hind margin more or less, are æneous in some specimens; 2nd and 3rd segments with yellowish-white, scale-like, pubescence at extreme sides; 4th at sides, and

5th at tip, with thin grey pubescence. Venter bare, moderately shining black. *Legs*: coxæ black; front surface of front pair, and hind surface of hind pair, with a little grey tomentum. Femora bright reddish-brown, only extreme tip blackish; hind pair with distinct subapical tooth below. Tibiæ with about basal half reddish-brown, rest black; with a white or yellowish tomentose spot on front and hind sides of fore and hind pairs respectively, reaching for a short distance from the base, but extending on outer side of middle pair nearly to tip. Tarsi black, pulvilli bright brown. Hind femora on apical half of front side with a fringe of rather coarse short black pubescence; basal half with a shorter similar fringe; legs otherwise with only microscopic pubescence. *Wings* quite clear; costal and subcostal cells dark brown to tips; the wing dark brown from the base over an area bounded by an oblique

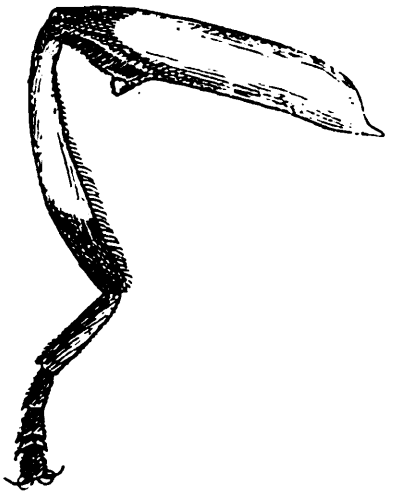

Fig. 38.—*Megaspis crassus*, Fabr., hind leg.

line reaching from the stigmatic region across outer side of 2nd basal cell and thence across middle of anal cell to the alula. A narrow, dark brown, isolated streak from 2nd to 4th longitudinal veins, enclosing anterior cross-vein. The brown colour is expanded for a minute space at tip of 2nd vein, and there is a minute dark spot over tip of 3rd vein. Thoracal squamæ blackish, with broad blackish-grey fringe.

Length, about 12 mm.

Described from a number of both sexes from various sources. A widely distributed Oriental species, recorded also from Celebes. Mussoorie; Sikkim (*Knyvett*; *de Nicéville*); Singla, 1500 ft. (*Lord Carmichael's collector*); Siliguri; Buldana District, Berar (*Burkill*); Bangalore (*Cameron*); Parambikulam, Cochin State, 1700–3200 ft. (*Gravely*); Maddathorai and Trivandrum, Travancore State (*Annandale*); Goa; Castle Rock, N. Kanara District; Talewadi (all from the last three localities collected by *Kemp*); Mangaldai, Assam (*Kemp*); Sibsagar (*Peal*); Ranchi (*Imms*); above Tura, 3900 ft., viii. 1917 (*Kemp*); Mormugao.

Macquart erected the genus *Dolichomerus* for this species on account of the toothed hind femora and other characters, and I do not know why it should not be adopted.

157. Megaspis errans, *Fabr.*

Syrphus errans, Fabricius, Mant. Ins. ii, p. 337 (1787).
Eristalis errans, Wiedemann, Auss. Zweifl. ii, p. 155 (1830).
Eristalis varipes, Macquart, Dipt. Exot. ii, 2, p. 46, pl. x, fig. 4 (1842).
Eristalis amphicrates, Walker, List Dipt. Brit. Mus. iii, p. 623 (1849).
Eristalis macquartii, Doleschall, Nat. Tijd. Ned. Ind. x, p. 410, pl. vii, fig. 1 (1856).
Megaspis errans, Brunetti, Rec. Ind. Mus. ii, p. 71 (1908).

♂ ♀ Differing from *argyrocephalus* as follows:—Eyes in ♂ contiguous for a much longer distance and upper facets distinctly larger than lower ones. Facial bump orange-yellow; pubescence of frons and face more yellowish than white; that on vertical triangle, however, dark brown. Antennæ wholly orange, arista orange, quite bare. Ground-colour, including frontal callus and mouth-border, orange-yellow; central bump normally covered by the pubescence, but space over mouth-border, and the strip thence on each side to eyes, bare, orange-yellow. Vertex broadly black with dense short blackish-brown pubescence. *Thorax*: dorsum practically all blackish, with suture on each side for a greater or less distance pale, partly dividing the black part; and as the anterior half is usually duller black than the hinder, or even greyish, there is in such specimens some resemblance to *argyrocephalus*. Hind margin of dorsum broadly yellowish-grey, and anterior half with two rather broad, approximate, median, short stripes which are always obvious when seen from behind but never conspicuous. Pubescence yellow on anterior and hinder parts, dark brown on black median part below suture. *Abdomen* brownish-orange; 2nd, 3rd and 4th segments each having on hind border a large blackish-brown triangular spot, filling one-third or more of the surface and extended more or less along hind margin. Remainder of surface of 3rd and 4th segments æneous, this colour extending occasionally also along hind border, thus isolating the dark triangular spot. *Legs* as in *argyrocephalus* except that the basal half, more or less, of hind femora is brownish-orange. *Wings* as in *argyrocephalus*.

Length, 9–11 mm.

This species and *argyrocephalus* are very closely allied, but the colour of the hind femora and the presence or absence of pubescence on the arista will separate them with certainty.

Described from a number of both sexes from various sources. Very common throughout the East. Sukna (*Annandale*); Pusa; Bangalore (*J. Cameron*); Trivandrum, Travancore; Parambikulam, Cochin State (*Gravely*); Coorg, S. India, 29–30. iv. 1913;

Hadagalli, Ceylon, x. 1911; Margherita, Assam; Myingyan, Burma, xi. 1893 (*Capt. Watson*); Maymyo, Upper Burma (*H. L. Andrewes*); Sibsagar (*S. E. Paul*); Penang, 25. ii. 1908 (*G. Meade-Waldo*); Semarang and other Javan localities; Borneo, Sumatra and China.

158. **Megaspis chrysopygus**, *Wied.*

Eristalis chrysopygus, Wiedemann, Zool. Mag. i, p. 3 (1819); id., Auss. Zweifl. ii, p. 152 (1830).
Megaspis chrysopygus, Macquart, Dipt. Exot. ii. 2, p. 27, pl. vii, fig. 2 (1842); de Meijere, Tijd. v. Ent. li, p. 240 (1908).
Volucella aurata, Macquart, Hist. Nat. Ins., Dipt. i, p. 494 (1834).

♂ ♀ *Head*: eyes in ♂ very closely contiguous for nearly their whole length, leaving a very small, raised, ocellar triangle with dull red ocelli; frons and face black, finely punctate, the wrinkled space large and obvious, dull orange-brown. Antennæ blackish-brown; arista dull orange, plumose above on basal half. Face with short yellowish hairs, rather deeply sunken immediately below base of antennæ and with a bare, shining, rather inconspicuous, elongate central bump. Occiput black, the sides shining silvery-white, practically bare. In ♀, frons one-fifth the width of the head at vertex, widening gradually downwards, being about one-third of head at level of antennæ; wholly black, finely punctate, face with a little almost microscopic whitish pubescence. *Thorax* black, minutely punctate; pubescence black, very short and invisible except when viewed at a low angle. *Abdomen* shining black; 3rd and 4th segments covered with short dense golden- or orange-yellow recumbent pubescence; venter moderately shining, black. *Legs* all black, with very short black pubescence; posterior tarsi and pulvilli, also front pulvilli, bright orange-yellow. A small spot of white pubescence at base of tibiæ on front side of fore pair, on outer side of middle pair and on hinder side of hind pair; hind tibiæ rather flattened, with dense shaggy black pubescence on front and hind sides. *Wings* pale grey; blackish on about basal half up to the stigma, basal three-fourths of 1st basal cell, whole of 2nd basal cell and more than half of anal cell, with a slight extension embracing anterior cross-vein. Thoracal squamæ large, blackish, with broad concolorous fringe.

Length, 15–17 mm.

Described from two or three ♀ ♀ from Sikkim (*Knyvett*); Shillong, 5000 ft., ix. 1917 (*Fletcher*); Sibsagar (*S. E. Paul*); Khasi Hills (*Sladen*; *Chennell*); Bhamo Hills, Upper Burma, 4000 ft., v. 1916 (*Mackwood*). Occurs in Java, Sumatra and Siam.

159. **Megaspis æsymnus**, *Walk.*

Eristalis æsymnus, Walker, List. Dipt. Brit. Mus. iii, p. 630 (1849).

♂ ♀. *Head*: frons in ♂ moderately prominent, shining black, with long dense black pubescence on upper part, the wrinkled

space above antennæ very distinct, the space on each side of it yellowish-dusted, with yellowish-brown pubescence. Antennæ dark brown, arista with basal half orange, plumose; rest black, bare. Facial bump shining black, moderately large; rest of face with brownish-yellow dust and pubescence. Lower part of head and proboscis black. Occipital margin on lower part rather shining white; a shining black, nearly bare space on cheeks. In ♀, frons rapidly widening from above downwards, at level of antennæ wider than one-third of head; vertex black, with dense, short, black, stiff pubescence; a black, moderately wide median stripe extends thence to the wrinkled space, which latter bears similar pubescence. Upper part of frons (below the black vertex) with yellowish dust and concolorous pubescence, thence both ground-colour and pubescence become gradually more whitish to lower part of head; the shining black central bump is comparatively small. *Thorax*: ground-colour of anterior part orange nearly to suture, the colour carried over shoulders for some distance down the pleuræ, covered with short bright yellow pubescence; rest of dorsum black, with very short, dense, black pubescence. Scutellum similar; pleuræ dull black or æneous, more or less tinged with yellowish in humeral region. *Abdomen* black; 2nd segment orange for about anterior two-thirds, this colour just reaching side margins of 1st segment; 3rd and 4th segments mainly dull black, but with a narrow orange band on anterior margin, widening towards corners; hind margins rather broadly shining black, broader in middle; 5th segment all black. Venter black; 2nd segment orange. Pubescence of abdomen mostly black, but pale yellow on the orange-coloured parts. *Legs* black, with black pubescence. *Wings* pale grey, anterior half moderately dark brown, the colour approximately limited by the basal cells and marginal cell; about half the discal cell paler brown; 3rd vein very deeply looped and with a distinct, short appendix at tip of loop; halteres yellowish.

Length, 12–14 mm.

Described from a ♂ and several ♀ ♀ in the British Museum from Borneo and Sumatra. Walker's *type* is in the British Museum in very bad condition; it was described from "East Indies." The species requires confirmation as Indian, and I do not believe it to be indigenous.

160. **Megaspis argyrocephalus**, *Macq.* (Pl. IV, fig. 20.)

Eristalis argyrocephalus, Macquart, Dipt. Exot. ii, 2, p. 45, pl. x, fig. 5 (1842); de Meijere, Tijd. v. Ent. li, p. 240, notes (1908).
Megaspis transversus, Brunetti, Rec. Ind. Mus. ii, p. 73, fig. thorax (1908).

♂ ♀ *Head* in ♂ with vertical triangle small, elongate, black; eyes contiguous for a rather short distance, all facets practically uniform. Ground-colour of head black, frons with snow-white

tomentum and concolorous pubescence; frontal callus black, bare; face clothed as frons, central bump, extreme mouth-border and a band thence to the eye on each side, shining black, bare. Occiput with silvery-white tomentum on margin of lower half, yellowish-grey tomentum on upper half, and a little white pubescence on under side. Antennæ reddish-brown or blackish-brown, arista orange, plumose on basal half; proboscis black. In ♀, frons less than one-fourth of the head at vertex and more than a third at level of antennæ; frons and face together very little broader at broadest part than at vertex, both shining black, closely covered (except broadly across vertex, which is covered with dense short blackish-brown pubescence) with snow-white tomentum and white pubescence, both of which are more yellowish-grey on upper part of frons, immediately below vertical region. *Thorax*: dorsum blackish, minutely punctate; anterior and hinder thirds greenish-grey, sometimes greenish-yellow in front, with rather long fine yellow inconspicuous pubescence; middle third with dense, very short, blackish-brown pubescence. Pleuræ grey, with fine yellow pubescence; a bunch of thicker, darker yellow pubescence on shoulders. Scutellum black, with similar pubescence and some long, fine yellow hairs on hind border. *Abdomen*: 1st segment black except narrowly pale at sides; 2nd orange-yellow with broad blackish hind margin, extending forward in middle to beyond centre of segment; 3rd and 4th blackish, a large æneous spot on each anterior corner. In ♀, 3rd segment mostly pale æneous, with an ill-defined blackish-brown triangle near middle of hind margin, extending narrowly along margin towards sides; 4th segment similar, with an ill-defined spot in middle of hind margin. Pubescence in both sexes yellow, more conspicuous on 2nd segment, and thinner in ♀ than in ♂ Venter with basal half yellowish, apical half blackish. *Legs* black; coxæ with a little pale pubescence; femora dark brown, sometimes lighter brown, sometimes practically black; *always unicolorous*, except that the extreme tip may be orange or brown; pubescence yellowish, a little short dark brown pubescence on inner side of fore and middle pairs. Pubescence on hind pair mainly confined to upper and lower sides, yellowish except towards tips, where it is dark brown. Tibiæ mainly yellowish on basal, and black on apical, half (with yellowish pubescence throughout); extent of black and yellow variable; hind tibiæ sometimes nearly all black, with dark brown pubescence on inner side. Tarsi blackish-brown, with yellowish-grey to orange-brown pubescence below. *Wings* pale grey, brown at base and pale yellowish-brown on about basal half or two-thirds of the anterior portion. Halteres yellow.

Length, 9–12 mm.

Described from a number of both sexes from various sources. A common and widely distributed Oriental species. Deesa, vii–viii. 1901 (*Nurse*); Parasnath, Chota Nagpur, 4300–4400 ft.; Ranchi (*Imms*); Calcutta; Pusa, Bihar, iii. 1907 (*Lefroy*, etc.); Bangalore, 3000 ft. (*Annandale*, *Cameron*); Talewadi, N. Kanara

District, 3–10. x. 1916 (*Kemp*); Travancore (*Annandale*); South India, 2500 ft.; Coimbatore, iv. 1915 (*Duff*). In the British Museum are examples from Belgaum, Bangalore, Coonoor, Purneah, Calcutta and Burma.

M. transversus was described from a long series of both sexes in the Indian Museum from Calcutta and Bangalore.

Type in Paris Museum.

161. **Megaspis zonatus**, *Fabr.*

Syrphus zonatus, Fabricius, Mant. Ins. ii, p. 337 (1787).
Syrphus zonalis, Fabricius, Ent. Syst. iv, p. 294 (1794).
Eristalis zonalis, Wiedemann, Auss. Zweifl. ii, p. 152 (1830).
Eristalis flavofasciatus, Macquart, Dipt. Exot., Suppl. iv, p. 136 (1849).
Eristalis inamames, Walker, List Dipt. Brit. Mus. iii, p. 627 (1849).
Eristalis andræmon, id., loc. cit.
Eristalis datamus, id., op. cit. p. 628.
Eristalis exterus, id., Ins. Saund., Dipt. i, p. 248 (1852).
Musca sinensis, Gmelin, Syst. Nat. v, p. 2872 (1790).

♂ ♀ *Head*: ♂, eyes contiguous for a short distance; vertical triangle small, black, with dark brown pubescence; frons with black hairs on upper part and black and yellowish hairs mixed on each side of the wrinkled space. Face shining black, with grey dust forming a transverse band below antennæ, and more or less grey dust on cheeks; all these parts with yellowish-grey, moderately long, but inconspicuous pubescence; central bump bare. Antennæ blackish-brown, arista yellowish, basal half plumose (about 9 or 10 long hairs) above and below. Occiput black, narrowly white-tomentose on side margins, with brownish-yellow hairs on vertical section and white pubescence on lower margin. In ♀, frons at level of antennæ rather more than one-third the width of the head, narrowing towards vertex and a little wider on lower part. Vertex black with black pubescence; yellowish at sides with yellow pubescence down to antennæ, leaving the median third down to the wrinkled space black, with dark brown pubescence. *Thorax*: dorsum black, anterior margin narrowly yellowish-grey, almost orange at and just behind shoulders; whole anterior half of dorsum covered with dense short yellowish-grey pubescence, hinder half with shorter and very dense blackish-brown pubescence, almost unnoticeable; a bunch of scale-like, long, orange pubescence behind shoulders, and a fringe of similar pubescence along lower margin of dorsum up to above and a little beyond wing-base. Pleuræ yellowish-grey anteriorly, darker posteriorly, with a little pale pubescence throughout. Scutellum black with very short and dense black erect pubescence and a fringe of pale hairs on hind margin. *Abdomen*: 1st segment black, very short, bare except for a very little yellow pubescence towards sides; 2nd mainly yellowish, about the hind third (varying to less than a fourth) dark blackish-brown, deepest on hind border; 3rd and 4th mainly black, each with two elongate brownish-yellow spots,

one on each anterior corner, these spots narrowest at their inner ends, which nearly meet in centre of anterior margin. Pubescence of 2nd segment agreeing with ground-colour, that of 3rd and 4th segments wholly brownish-orange; 5th segment black with yellowish-grey pubescence. Sides of abdomen with orange-yellow short pubescence. Venter yellowish, generally with blackish bands corresponding with those of the dorsum; but varying to entirely pale yellowish except the blackish tip. *Legs*: femora all black, pubescence dark, except some pale yellowish pubescence on upper side of hind pair towards base. Tibiæ black, 1st pair pale on basal third, 2nd pair on about basal half; hind pair wholly black but with some white pubescence at tip on hinder side and a fringe of dark brown dense pubescence on rest of hinder side. Tarsi black, middle pair brownish-orange for more than basal half; hind pair with orange-brown pubescence. *Wings* yellowish-grey; a dark brown suffusion over stigmatic region, extending from costa over base of submarginal and tip of 1st basal cell, slightly clouding anterior cross-vein and base of discal cell. Extreme base of wing dark brown for a short distance; squamæ dark brown.

Length, 12–14 mm.

Described from a number of both sexes from various sources. Sylhet; Sikkim (*Knyvett*, *De Nicéville*, *Stoliczka*); Darjiling District, 1000–3000 ft. (*Lord Carmichael's collector*); Nilgiris, 3000 ft. (*Andrewes*); Sibsagar, N.E. Assam (*S. E. Paul*); Mazbat, Assam (*Kemp*); Dunsiri Valley, Assam (*Godwin-Austen*); above Tura, 3500–3900 ft., 15. vii–30. viii. 1917 (*Kemp*); Lower Ranges, Khasi Hills, Assam, 1878 (*Chennell*, a long series of ♂♂, ♀♀ in British Museum). Generally distributed through the East as far as Japan. The synonymy of Walker's four species, the *types* of all of which are in the British Museum, is due to Major Austen. *E. andræmon* is from Sylhet, *exterus* from India, no closer data being available. *E. inamames* was described from the Sandwich Is., and *datamus* without record of locality.

Genus **HELOPHILUS**, *Meig.**

Helophilus, Meigen, Syst. Beschr. iii, p. 368 (1822).
Elophilus, Meigen, Illig. Mag. ii, p. 274 (1803).
Dolichogyna, Macquart, Dipt. Exot. ii, 2, p. 65 (1842).
Lejops, Rondani, Dipt. Ital. Prod. ii, p. 33 (1857).
Mesembrius, Rondani, t. c. p. 50, *nota* (1857).
Anasimyia, Schiner, Cat. Syst. Dipt. Eur. p. 108 (1864).
Eumerosyrphus, Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. cxxviii (1882), and iii, p. 228 (1883).
Eurhimyia, Bigot, Ann. Soc. Ent. France, (6) iii, p. 226, and Bull. p. xx (*Eurimyia*) (1883).

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* For a table of, and notes on, the Oriental species, see Brunetti, Rec. Ind. Mus. ii, p. 65 *et seq.*; also de Meijere, Tijd. v. Ent. li, p. 229 (1908).

Eurymyia, Mik, in Beck, Faun. v. Hernstein, p. 528 (*sep.*, p. 68) (1885).
Eurinomyia, Mik, Wien. Ent. Zeit. xvi, p. 115 (1897).
Parhelophilus, Girschner, Illus. Wochenschr. f. Entom. ii, p. 604 (1897).

GENOTYPE, *Musca pendula*, L.; by designation of Curtis, Brit. Ent. (1832).

Helophilus differs from *Eristalis* structurally in the form of the marginal cell, which is definitely though sometimes narrowly open, and in having the eyes always bare. Other characters of the genus are that the thorax is generally longitudinally striped and the yellow markings more extensive. *Head* as in *Eristalis*, but the eyes in the ♂ always narrowly but distinctly separated, wider apart still in the ♀ and, with rare exceptions, always bare in both sexes; arista always bare. *Thorax* generally black with conspicuous yellow longitudinal stripes; usually less pubescent than in *Eristalis*. *Abdomen* nearly always blackish with large conspicuous (mostly yellow) side spots and pale transverse bands. *Legs* rather strong, hind femora thickened, occasionally furnished with a process on under side, hind tibiæ curved. *Wings* with venation of *Eristalis* except that the marginal cell is narrowly open.

Life-history. The larva lives in stagnant water, and is not readily distinguishable from that of *Eristalis*.

Though inclined to favour marshy districts, *Helophilus* occurs in nearly all localities. Its way of hovering and its other habits are similar to those of *Eristalis*. Several subgenera have been suggested, based on the width of the frons in the ♂, the shape of the 3rd antennal joint and the degree of prominence of the face, but the genus, even in its widest sense, is a natural one, and is better preserved in single form.

Table of Species.

1.	Thorax with a transverse band of whitish pubescence.	*curvigaster*, Macq., p. 206.
	Thorax without such a band	2.
2.	Body æneous.	*æneus*, Brun., p. 206.
	Body yellow and black, of the ordinary *Helophilus*-type	3.
3.	Length 14–18 millim..	*insignis*, Walk., p. 207.
	Length 9–12 millim.	4.
4.	Middle femora in ♂ with a tooth below near base, and suddenly contracted at tip; 4th abdominal segment with an inverted, widely open V-mark*.	*bengalensis*, Wied., p. 209.
	Middle femora in ♂ without tooth below, and very gradually narrowed in apical part; 4th abdominal segment without a V-mark	*quadrivittatus*, Wied., p. 210.

* Sometimes almost arcuate.

162. **Helophilus æneus**, *Brun.* (nom. emend.). (Pl. V, fig. 8.)

Helophilus aënus, Brunetti, Rec. Ind. Mus. ii, p. 66 (1908), and i, pl. xii, fig. 15, full ins. (1907).

♀ *Head* black, face moderately produced, very shining and bare above antennæ, but changing on vertex to dull velvet-black with black hair, frontal space narrowing above, ocelli very close together. Face below antennæ dull black, with (seen from above) silvery-grey hair; a central shining bare black line. Antennæ dark brown. Back of eyes with a thin silvery-white line, with unicolorous hair. *Thoracic* dorsum blue-ash-grey with two transverse black bands, one across the centre and one on the posterior border. Anterior part of thorax cinereous, with two faint, narrow, darker stripes in centre, which disappear on reaching the 1st transverse black band; whole dorsum covered with short bright yellow hair. Sides of thorax light cinereous-grey, with some yellow hair. Scutellum blue-ash-grey, basal half black; entirely covered with bright yellow hair. *Abdomen* æneous, 1st segment paler; 2nd with a rather broad, dead black, velvet line on base, joined by a stem to a similar band on the posterior border, which band, however, is curved upward a little in the middle, clear of the actual hind margin; 3rd segment with a central round spot, joined to two moderately broad lines which proceed obliquely almost to the posterior corners; 4th segment with a nearly similar pattern, the oblique lines joining one another in the centre—without being enlarged into a dorsal spot. All these abdominal marks dull velvet-black. The whole upper surface of the abdomen with rather close, short, yellow hair. Venter black. *Legs*: femora black, hind pair more shining, all with yellow hair below; tibiæ and tarsi tawny-yellow, with some yellow hair; hind pair with apical half black. *Wings* pale grey, costal cell absolutely clear, stigma brown, small, veins brownish; halteres and tegulæ pale yellow.

Length, 10 mm.

Described from one ♀ in the Indian Museum collection; Soondrijal, Nepal (October). It reminds one very much of the European species *Eristalis sepulchralis*, L.

163. **Helophilus curvigaster**, *Macq.*

Helophilus curvigaster, Macquart, Dipt. Exot. ii, 2, p. 62, pl. xi, fig. 1 (1842); de Meijere, Bijd. tot Dierk. p. 99 (1904); id., Tijd. v. Ent. li, p. 232 (1908).

♂ *Head*: eyes bare, contiguous only at a point; vertex dull black, black-haired. Frons and epistome with dense white pubescence and a narrow shining black median stripe, which does not reach the antennæ; latter black with yellowish arista. Only immediately above the antennal prominence is the frons shining black. *Thorax*: dorsum blackish-brown with rather dense but

short yellowish-white pubescence; scutellum brownish-red. *Abdomen* much narrowed posteriorly, tip rather clubbed. On 2nd segment a brown band and behind it a black one near posterior margin, both broadened in middle and not reaching side margins. Two next segments always with two dull black cross-bands, which reach side margins, and on 4th segment are even themselves joined below. 5th segment only black at tip and sides. The reddish-brown parts of the abdomen are rather deeper, shining, the black parts dull; emarginations whitish. Pubescence short, whitish, but black on the black parts. *Legs*: fore pair mainly yellowish-brown; front side, and in the femora the upper side also, blackish-brown. Hind femora yellowish-brown, black above and at tip, and in addition with a black ring above middle and a blackish spot on outer side near base. Tibiæ nearly wholly dark; tarsi yellowish-brown. A large yellowish-brown obtuse prominence at base of hind femora. *Wings* clear; a blackish streak between the auxiliary and subcostal veins.

Length, 11 mm.; of wing, 8 mm.

♀ Frons and face shining black, with yellowish-white dust at sides; antennæ brown, arista tawny; eyes bare. Thorax lightly grey-dusted, more thickly so along suture; scutellum testaceous. Abdomen curved underneath towards tip, each segment with a black band behind anterior margin and before hind margin. Legs testaceous, with yellowish pubescence; femora black on upper side, hind pair thickened, a post-basal black ring and a post-basal black spot on their under side. Wings slightly yellowish.

Described originally from a ♂ in Serville's collection from Java. De Meijere redescribed (1904) the species from a ♂ from Darjiling and a ♀ from an unrecorded locality, but in his later paper (*op. cit.* 1908) he recognised the supposed ♀ as the ♂ of an allied African species. My description of the ♂ is a translation of de Meijere's description of that sex, and that of the ♀ given above is translated from Macquart's original description.

164. **Helophilus insignis**, *Walk.* (Pl. V, figs. 6, 7.)

Helophilus insignis, Walker, Proc. Linn. Soc. Lond. i, p. 17 (1856); Doleschall, Nat. Tijd. Ned. Ind. xiv, p. 409, pl. ix, fig. 4 (1857).
Helophilus doleschalli, Brunetti, Rec. Ind. Mus. ii, p. 68 (1908), and i, pl. xii, figs. 7, 8, 9 (1907); de Meijere, Tijd. v. Ent. lvii, p. 148 (1914).

♂ ♀ *Head*: in ♂, vertical triangle very elongate, black with yellowish-grey dust and a little black pubescence. Eyes touching for only three or four facets, the latter uniform in size. Frons and face yellow-dusted, covered with long soft pale yellow pubescence; antennal prominence very prominent, shining black with long erect stiff black hairs; the extreme edge brownish-orange; facial median line shining black, bare. Antennal 1st and 2nd joints brownish-orange to blackish, arista brown. Upper mouth-border with yellowish-grey dust but without pubescence. Occiput

wholly with orange-yellow tomentum and pale yellow pubescence. *Thorax* bright yellow with three longitudinal stripes as in *bengalensis*; whole dorsal surface with short dense yellow pubescence. Pleuræ with yellow tomentum in front and with hinder part ash-grey; a bunch of long yellow pubescence behind shoulders, extending downwards over mesopleura. Scutellum orange-yellow with dense yellow pubescence. *Abdomen* longer and more conical in ♂ than ♀; 1st segment mainly black, orange-yellow towards sides; rest of abdomen best described as moderately shining black; on 2nd segment, a little above centre, a pair of large oblong orange-yellow spots, which are narrowly separated by the median intervening space, their inner ends barely narrowed, extending in their full breadth to side margins of segment; width of remaining black hind margin varying but always fairly broad; 3rd segment with a broad basal yellow band occupying about half the segment; in ♂ this band is sometimes indefinite, and the segment then is best described as black, with anterior corners irregularly and indefinitely orange; 4th segment much more elongate in ♂ than in ♀, moderately shining black, base and anterior corners dusted with yellowish-grey to a varying extent. Genitalia shining black. Venter with basal half generally yellowish, apical half nearly black. Pubescence yellow and black according to ground-colour. *Legs* * moderately shining black; coxæ grey-dusted with black pubescence; tips of femora narrowly brownish-orange; fore tibiæ on more or less the basal third or half, middle pair on more than basal half, hind pair broadly at base, brownish-orange. Anterior femora with rather short black pubescence on upper and inner sides; outer side nearly bare, but a fringe of long black hairs on lower part of outer side; under side with long, dense, very bright yellow or orange-yellow pubescence. Hind femora on upper side with sparse short black pubescence; outer side with dense long yellow pubescence; lower and inner sides with very dense black long pubescence. Pubescence on anterior tibiæ generally black on inner and front sides, and yellow on outer and hinder sides; hind tibiæ with fairly long black or blackish-brown pubescence, very long and dense on outer side in ♂ *Wings* pale yellowish-grey; squamæ, fringe and halteres brownish-yellow.

Length, 15–18 mm.

Described from a ♂ and ♀ in the Indian Museum, the ♂ from Mergui, Burma, the ♀ without record of locality. Whether I originally identified it correctly as Doleschall's *insignis* or not, at any rate the species here described is certainly synonymous with Walker's species of that name, which moreover takes precedence. I now think both forms are probably identical. A ♀ from Borneo and one from Singapore, 19. i. 1896, below 400 ft. (*S. S. Flower*),

* The description of the legs must be accepted with caution as the specimens are none of them in good condition.

both in the British Museum, as well as Walker's *type* ♀, all agree exactly with the ♂ and ♀ described by me. *H. albiceps*, van der Wulp, according to two ♀ ♀ so named in the British Museum, may be identical, the only differences being that the spots on the 2nd abdominal segment are broader, more quadrate and rather more widely separated, and that the insects are smaller.

165. **Helophilus bengalensis**, *Wied.* (Pl. V, figs. 1–3.)

Eristalis bengalensis, Wiedemann, Zool. Mag. i, p. 3 (1819); id., Auss. Zweifl. ii, p. 167 (1830); de Meijere, Tijd. v. Ent. li, p. 233, pl. vii, figs. 13, 14, legs (1908); Brunetti, Rec. Ind. Mus. ii, p. 69 (1908); i, pl. xii, figs. 1, 2, 3, ♂ ♀ abdomen (1907).

Eumerosyrphus indianus, Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. cxxviii (1882).

♂ ♀ *Head*: eyes in ♂ contiguous for less than one-third the distance from vertex to frons (about 5 or 6 facets); upper facets distinctly larger than lower ones; vertical triangle elongate, shining black above; a little yellowish-grey tomentum on lower part, the whole with black pubescence. Frons and face wholly covered with yellow tomentum and concolorous pubescence; median black stripe on latter narrow; central bump small; tip of small antennal prominence shining dark brown. Antennal 1st and 2nd joints black; 3rd dark brown with bare brown arista. Proboscis black. Occiput black, side margins and lower side with white tomentum and white pubescence; yellowish tomentum and pubescence on vertex. In ♀, frons one-sixth width of head at vertex, widening gradually to $1\frac{1}{2}$ times as wide at level of antennæ, covered with yellow tomentum and pubescence, but on the vertex the tomentum is more dark greyish and the pubescence black. Antennal prominence and antennæ shining orange-brown to blackish, with a little microscopic grey dust on 3rd joint. *Thorax* bright yellow with three longitudinal black stripes; the median stripe slightly wider than the others, extending from anterior border nearly or quite to hind margin, not narrowed in front but generally narrowed behind to a point; outer stripes rather narrowly separated from the median one but narrower in front and behind, barely attaining anterior and hind margins. Pleuræ yellowish-grey, slightly darker behind. Scutellum translucent yellow, a little darker at base. Whole dorsum, pleuræ and scutellum with soft yellow pubescence. *Abdomen*: 1st segment black, remainder orange-yellow; 2nd segment with basal and hind marginal black bands, broader in middle (former not attaining, latter attaining, the side margins), joined by a median black band of varying width which may sometimes be practically absent; hind marginal band sometimes replaced by merely a deeper orange than the ground-colour. 3rd segment with a depressed black triangular spot on hind margin, reaching side margins and often extended forward in centre as a fine line as far as middle of segment. Pubescence on first three segments very short and

fine, yellow on yellow parts, dark brown on black parts. 4th segment with close yellow, yellowish-grey or orange tomentum; hind margin more or less moderately shining brown or blackish; a bow-shaped or inverted **V**-shaped mark, which may be deep orange, brown or black, lies (the convexity forwards) across middle of segment; space between it and the dark hind margin (which latter is not always definite) darker than on anterior half of segment. Pubescence of 4th segment all yellow except on the dark parts. Venter yellow with yellowish pubescence, tip darker. *Legs*: coxæ black, a little grey dust on front side of anterior pairs and on hinder side of hind pair, with a little pale pubescence. Femora shining black, anterior pairs with tips narrowly brownish-orange; middle pair in ♂ with a small tooth near base and suddenly contracted at tip. Pubescence of all femora wholly yellow except some moderately long black pubescence towards tip on under side of hind pair. Tibiæ black; about basal half of anterior pairs orange-yellow; middle pair in ♂ with a small swelling just before middle and slightly thickened towards tips; rather long yellow hair on outer and front sides of fore pair; pubescence very short on middle pair; hind tibiæ distinctly curved, with mainly black pubescence, but some yellow pubescence on basal half of outer side. Tarsi black, with black pubescence, middle pair more or less brownish-orange on basal half; a peculiar fan-like fringe of hairs with thickened tips at extreme base of hind metatarsi. *Wings* pale grey; squamæ yellow with yellow fringe; halteres yellow.

Length, 10–12 mm.

Described from a number of specimens of both sexes. In two ♂ ♂ in the Indian Museum from Calcutta, 21. iii. 1907 (*Brunetti*), and Siripur, Sardu, North Bengal, 26. ix. 1910, and in two more ♂ ♂ in the Pusa collection from Pusa, 14. viii. 1907 and 29. ix. 1910, the yellow spots on the 2nd segment are reduced to a semicircle by a large central black spot in each, also the 3rd segment is mainly blackish. The species is apparently widely distributed throughout India, as I have seen it from Katmandu, Nepal; Calcutta; Deesa, vi. 1897 (*Nurse*); Pusa, vii. viii. ix.; Bangalore; Sibsagar, N.E. Assam (*S. E. Paul*). De Meijere records it from Java, and Kertész (Cat. Dipt. vii, p. 250) gives "Southern Asia, Indian Archipelago."

H. pilipes, Dol., has been regarded as synonymous with this species, but I have withdrawn the name as I am not satisfied that it is identical. Bigot's type of *Eumerosyrphus indianus* is a ♂ of *bengalensis*.

166. **Helophilus quadrivittatus**, *Wied.* (Pl. V, figs. 4, 5.)

Eristalis quadrivittatus, Wiedemann, Zool. Mag. i, p. 3 (1819); id., Auss. Zweifl. ii, p. 168 (1830); de Meijere, Tijd. v. Ent. li, p. 234, ♂ ♀ redescr., pl. vii, fig. 15, hind leg (1908); Brunetti, Rec. Ind. Mus. ii, p. 69 (1908); i, pl. xii, figs. 4, 5, 6, abdomen ♂ ♀ (1907).

♂ ♀ Very much like *bengalensis*, but with several good specific characters. In the ♂ the eyes gradually approach but at no point actually touch, nor is the frons linear for even the smallest distance. *Abdomen* mainly orange; 1st segment sometimes with centre of hind margin black; 2nd segment with a large triangular brown mark on base, not reaching sides but often drawn out hindwards, especially in ♂, into a narrow line or median stripe which may or may not reach a similar, more flattened, triangular spot on hind margin; the latter spot also sometimes attains side margins. 3rd segment with a similar flattened black triangle on hind margin, generally reaching side margins; 4th segment with apical half mainly black, the black colour broadest in centre, remainder with yellow tomentum, as has also the extreme hind margin. 5th segment with a large, shining black, but not very conspicuous, triangle, its apex reaching nearly to base of segment, on hind margin, remainder with yellow or yellowish-grey dust. Pubescence of abdomen wholly yellow; genitalia shining black. Venter generally with basal half yellowish, apical half blackish. *Legs* generally as in *bengalensis*, but the yellow in the anterior tibiæ is rather more extensive, especially in the middle pair, and the yellow pubescence rather brighter. In the ♂ the middle femora are without any tooth below and *not* suddenly contracted near tip; hind femora with a distinct comb-like fringe of short, stiff, black hairs on inner underside nearly from base to tip; middle tibiæ without any swelling before middle and not appreciably thicker at tip; hind tibiæ very suddenly narrowed near tip, forming almost a small tooth at point of compression. In ♀, legs simple, generally as in *bengalensis*.

Length, 10–12 mm.

Described from a number of specimens of both sexes. Siliguri; Jubbulpore, viii. 1907 (*Nurse*); Katihar (*Paiva*); Pusa, 19 and 26. ix. 1915; Deesa, vi. 1901 (*Nurse*); Calcutta; Port Canning; Puri (*Caunter*); Mandalay, 2–4. ix. 1914 (*Fletcher*). Apparently widely distributed in the plains of India; recorded also from the Aru Islands.

The degree of contiguity of the eyes and the structure of the femora and tibiæ will always distinctly separate the ♂♂ of *bengalensis* and *quadrivittatus*. As regards the ♀♀, the more extended orange surface of the abdomen and the markings of the 4th segment are apparently the only distinguishing features, though these, especially the latter, are generally sufficient when once the two species are clearly recognised.

Genus **MERODON**, *Meig.*

Merodon, Meigen, Illig. Mag. ii, p. 274 (1803).
Tigridiamyia, Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. cxxi (*Tigridemyia*, 1882).

GENOTYPE, *Syrphus clavipes*, Fabr. (as *curvipes*, Fabr.), by designation of Westwood, 1840.

Head about as wide as thorax. Eyes pubescent, contiguous in ♂ for some distance, wide apart in ♀; face slightly hollowed below antennæ, central knob of moderate size, upper mouth-edge produced; antennæ normal, 2nd joint rather long, 3rd oval, arista nearly basal, bare. Head pubescent. *Thorax* robust, slightly humped, longer than broad, densely pubescent, as is always the concolorous scutellum. *Abdomen* varying in shape and nature of pubescence; generally ovate or elongate. *Legs* strong, in ♂ always with a process or processes on either hind coxæ, hind femora or hind tibiæ; the latter curved, generally somewhat flattened; tarsi broad and flat; in ♀, legs simple. *Wings* comparatively short; venation as in *Helophilus*.

Life-history. That of *M. equestris*, Fabr., which infests the bulbs of Narcissi and allied plants, is well known, the species having often been bred (see also remarks under *Eumerus*, p. 248).

Range. All the Old World. Only one species, *M. equestris*, is known in the New World (North America), and it has undoubtedly been introduced inadvertently in bulbs.

Table of Species.

1.	Thorax wholly unstriped	*interveniens*, Walk., p. 212.
	Thorax more or less distinctly longitudinally striped	2.
2.	Abdomen conspicuously elongate, 1½ times as long as thorax and scutellum.	*tuberculatus*, Brun., p. 214.
	Abdomen elongate-conical, not much longer than thorax	3.
3.	Larger sp., 20 mm. .	*varicolor*, Walk., p. 215.
	Smaller spp., 12–16 mm.	4.
4.	Thoracic dorsum with three black stripes, the median stripe more or less subdivided	*pallidus*, Macq., p. 217
	Thoracic dorsum with four black stripes of about uniform size .	*albifasciatus*, Macq., p. 218.

167 **Merodon interveniens**, *Walk.*

Merodon interveniens, Walker, Proc. Linn. Soc. Lond. iv, p. 120 (1860).
Tigridiamyia pictipes, Rigot, Ann. Soc. Ent. France, (6) ii, Bull. p. cxxi (*Tigridemyia*, 1882).
Polydontomyia orientalis, Brunetti, Rec. Ind. Mus. ii, p. 74 (1908).

♂. *Head*: eyes bare, unicolorous, black; contiguous for a short distance only; vertical triangle a little raised, grey-dusted, with stiff black hairs and yellowish translucent ocelli; frons and face whitish-dusted, former with brownish-yellow pubescence, latter with whitish pubescence; cheeks nearly bare, rather shining brown; facial bump moderately prominent; a median, pale brown, rather shining stripe. Antennæ orange-brown, arista orange, bare. Occiput greyish, with short white pubescence on lower margin. *Thorax* dark brownish-grey, with rather dense yellowish pubescence, and some black hairs intermixed; humeri dull

brownish-yellow. Pleuræ nearly blackish-grey, with fan-shaped rows of yellow hairs on mesopleura, sternopleura and pteropleura. Scutellum brownish-yellow, with rather dense yellow pubescence. *Abdomen*: 1st segment orange-yellowish-grey, a little yellow pubescence at sides, rest brownish-orange; 2nd, 3rd and 4th segments with two transverse blackish-brown bands on

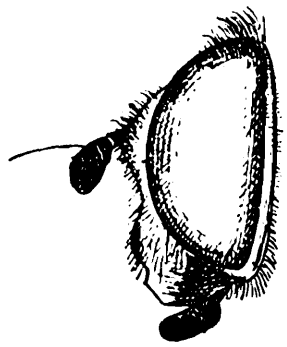

Fig. 39.—*Merodon interveniens*, Walk., head in profile.

each, those on 2nd segment a little arcuate, the others nearly straight, all placed a little behind anterior margin or a little in front of hind margin, leaving a rather broad intervening space between each pair of bands, the black bands varying a little in width and intensity. Venter brownish-yellow, with darker marks. Genitalia brownish-orange, tip black. *Legs* brownish or

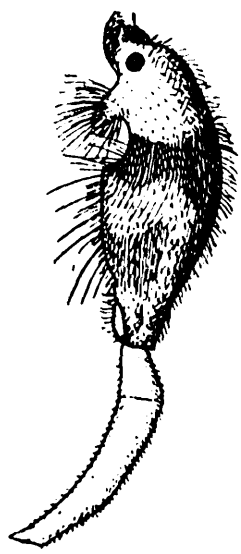

Fig. 40.—*Merodon interveniens*, Walk., hind femur and tibia.

brownish-orange, upper side of anterior femora blackish; anterior tibiæ more or less blackish in parts; middle pair paler. Fore tarsi mainly dark brown, last joint paler; middle tarsi nearly wholly pale. Hind femora orange, above and below towards tips, and on apical half on inner side, blackish. Hind tibiæ dark brown, hind tarsi brownish-orange, the colour apparently varying

in the legs with the individual. Pubescence of legs pale yellow. *Wings* pale grey; subcostal cell a little darker and a trifle yellowish; thoracic squamæ dull yellowish, with a pale yellow fringe; halteres orange.

Length, 11–12 mm.

Described from the *type* ♂ from Macassar in the British Museum, and two ♂ ♂ from Abu, Rajputana (*Col. Nurse*), in good condition. *Tigridiamyia pictipes*, Big., and *Polydontomyia orientalis*, Brun., are synonymous.

This is a very well-marked though not conspicuous species, easily recognised from all others by the two transverse black bands on each of the 2nd, 3rd and 4th abdominal segments, in conjunction with the strongly incrassated hind femora with a large yellow tooth below at the base, the unstriped thorax and the nearly clear wings. It is somewhat *Eristalis*-like in general appearance. I have closely compared side by side the types of Walker's *M. interveniens*, Bigot's *T. pictipes* and my *P. orientalis*, and find them identical (all males); two other ♂ ♂ are also before me, collected by Col. Nurse at Abu. "*Polydonta orientalis*" was a manuscript name of Bigot's for a single specimen in the Indian Museum, and I described the insect as new without sufficient examination as to its validity. That description deals with the legs in greater detail, and may be used to advantage in conjunction with the present fuller one, as the specimen described shows a few variations from the typical form. *Polydontomyia*, Will. (of which *Polydonta* and *Triodonta* are two preoccupied synonyms) is a good genus, and quite distinct from *Merodon* by the eyes in the ♂ being wide apart ($\frac{1}{5}$ or $\frac{1}{6}$ of the full width of the head in the type-species, *curvipes*, Wied.).

In "*Polydonta orientalis*" of Bigot (which therefore is not a true *Polydontomyia* at all), and in that author's *Tigridiamyia pictipes*, the eyes are actually contiguous, though for a very short space only. Williston (Man. N. Amer. Dipt., 3rd ed., p. 258) has suggested that both *Polydontomyia* and *Teuchocnemis* be merged in *Pterallastes*.

168. **Merodon tuberculatus**, *Brun.* (Pl. V, fig. 9.)

Helophilus tuberculatus, Brunetti, Rec. Ind. Mus. ii, p. 67 (1908); i, pl. xii, figs. 16, abdomen, 17, middle leg (1907).

♂ ♀. *Head*: epistome normally produced. Frons black, shining just above antennæ, dull in the ♀ from thence to vertex. Eyes contiguous (♂) at base of supra-antennal triangle, diverging gently to the vertex. Frons in ♀ moderately wide, narrower above; face below antennæ blackish or reddish, with grey or yellow hair, antennæ ferruginous-brown to black; 3rd joint sometimes quite greyish; first two joints with a few black hairs. Frons, vertex and back of head with short, stiff, wholly black hair. *Thorax* rather elongated, yellowish, with three broad black long

stripes of equal width (median stripe abbreviated behind) placed close together, so that the yellow intermediate space is very narrow; dorsum covered with short yellow hair. Humeral calli brown, with yellowish hair; posterior calli oval, distinct, shining. Sides of thorax blackish-grey with mixed tufts of brown, white and yellow hair; scutellum yellow with yellow hair. *Abdomen* quite elongated, resembling that of a *Milesia*; in ♂, 1st segment very short, yellow; 2nd tawny, with a thin basal black line produced downwards across the disc to a rather wide, very indistinct, blackish band towards posterior border; 3rd segment with basal half tawny, apical half brown; 4th segment similar, but only basal fourth yellowish; 5th segment uniformly rich brown. In the ♀, the transverse bands across the hind parts of the segments are black instead of brown. In the ♂, the first three segments are covered with soft yellow hair, much thicker on 2nd segment; this hair appears to be sparser in the ♀ *Legs* black, knees of four anterior legs tawny; all the femora much thickened in the ♂, but only the hind pair moderately so in the ♀ In the ♂, the hind femora bear a distinct tooth in the centre of the under side, and an erect fringe of bright yellow hair on the upper side for three-fourths of the length from the base, the remaining fourth bearing black hair. Middle femora with a transverse ridge below near tip, followed by a small blunt tooth; middle tibiæ suddenly incrassated before the middle, with two pairs of blunt teeth at base. Between middle and hind coxæ are two contiguous, large, conical, black teeth pointing hindwards. All the legs with short black pubescence, longest on femora and hind tibiæ. *Wings* brownish-grey; apical half, anteriorly, darker.

Length, 19–25 mm.

Described from 2 ♂ ♂ and 3 ♀ ♀ from Calcutta in the Indian Museum. Two ♂ ♂ in the Bigot Collection in very indifferent condition, without data.

169. **Merodon varicolor**, *Walk.*

Merodon varicolor, Walker, Proc. Linn. Soc. Lond. i, p. 122 (1857).

♂ ♀ *Head*: in ♂, eyes closely contiguous for about as far as length of vertical triangle; frons shining black with black hairs, forming the antennal prominence; a little short white pubescence on lower part of eyes in ♂ In ♀, frons just above antennæ nearly one-third of head, narrowing to half that width at vertex, very dark brown with rather dense black pubescence: frontal prominence shining black with black pubescence; face considerably cut away below antennal prominence, covered with pale yellowish tomentum; a median bare dark brown stripe; cheeks and mouth-opening shining brown, bare, clearly demarcated; proboscis blackish; antennal first two joints shining black, 3rd dull black, oval, arista brownish; occiput black. *Thorax*: anterior part down to the suture, the shoulders and pleuræ, dark brown with

rather dense dark brown pubescence; rest of dorsum dull yellowish, rather brighter towards hind margin, with four equidistant, moderately narrow, blue-grey, not very distinct, short, longitudinal stripes, the two median ones not reaching hind margin; whole hinder half of dorsum and the wholly yellow scutellum with short yellow pubescence; metanotum shining black, dusted with yellowish-grey; sternopleura and pteropleura yellowish, with pale hair, the colour gradually darkening to the brown upper sides of the thorax. *Abdomen*: 1st segment pale yellow with short pale yellow pubescence; hind angles orange. 2nd segment brownish-orange, becoming brown towards sides, with an elongated diamond-shaped yellow spot in middle, placed transversely; hind margin black, the colour not sharply defined, broader in middle. 3rd segment with about anterior half yellow, the colour broader in middle, sides and hind margin rather broadly black; rest of segment orange-brown. 4th segment similar to 3rd, the orange-brown part practically absent: 5th

Fig. 41.—*Merodon varicolor*, Walk., hind leg.

segment wholly black. The yellow and black parts of the abdomen bear concolorous pubescence respectively. Venter black with black pubescence; base more or less brownish. *Legs*: coxæ chestnut-brown, fore pair nearly wholly and hind pair in front with yellowish-grey tomentum; femora chestnut-brown, fore pair more or less black at base and on outer side; hind pair practically wholly black except below for a short distance at tip; these latter bear a distinct tooth below just beyond the base and an enlargement towards the tip without any actual tooth or spine; tibiæ blackish-brown, more or less broadly paler at base and narrowly at tip; hind pair thickened, curved, and with a recess about the middle to receive the enlarged under side of hind femora; tarsi dark brown, merging into black at tips. All the legs bear uniformly minute pubescence throughout. *Wings* yellowish-grey, with a slight dark brownish suffusion about stigmatic region; halteres brownish-orange.

Length, 20 mm.

Described from 3 ♂♂ from above Tura, Garo Hills, Assam, 3500–3900 ft., 15. vii–30. viii. 1917 (*Kemp*); and from a single ♀ from Peshoke Spur, Darjiling (*R. S. Lister*). All are in the Indian Museum. Walker's *type* (in the British Museum) agrees closely with the above description; it is a ♂ from Sarawak.

170. **Merodon pallidus**, *Macq.*

Merodon pallidus, Macquart, Dipt. Exot. ii, 2, p. 70, pl. xiii, fig. 1 (1842).

♂ ♀. *Head*: eyes black, shortly pubescent, contiguous in ♂ for one-fourth of the distance from vertex to upper angle of frons; vertical triangle elongate, blackish, with pale pubescence. Frons and face covered with rather long, silky, white pubescence, the underlying ground-colour of the face dull grey. Antennæ brownish-orange, proboscis black. Occiput white-dusted and with short pubescence; head not descending below eyes in profile. In ♀, frons broad, slightly widening, at level of antennæ nearly one-third of width of head; face with nearly parallel sides; frons with brownish-yellow, face with whitish, pubescence. *Thorax* yellowish-grey; dorsum with three rather wide black stripes of usual pattern, median one narrowly subdivided more or less distinctly and widening gradually hindwards; side margins of dorsum near wing-bases shining black for a short distance; the median stripe reaching anterior margin, the outer ones shortened in front and narrowing hindwards, but all three reaching hind margin. Pleuræ thickly covered with yellowish pubescence. Scutellum black, densely covered with pale brownish-yellow pubescence, which is conspicuous along entire hind margin. *Abdomen* elongate-conical, dusty yellow; 1st segment short, narrow, not easily visible, shining black. Indistinct orange markings in ♂, in the shape of a large inverted triangle on anterior margins of 2nd and 3rd segments and a similar triangle with its base on hind margins of same segments; 4th segment almost a replica of 3rd; all these markings indistinct. A small black, median, transverse mark a little behind anterior margin of 2nd segment, joined by a short line to a similar mark beyond middle of segment. In ♀, 2nd segment rather like that of ♂ but with hind margin more broadly brownish; 3rd segment brown on anterior third, dusty yellow on middle third and blackish on hind third; 4th segment dusky yellowish-grey, narrowly black on anterior corners and with a rather large oval black spot on each hind corner, placed clear of hind margin and sides; 5th segment entirely black, a little grey-dusted towards sides. Venter yellowish. Pubescence of abdomen very short, pale yellow. *Legs*: hind coxæ shortly and conically produced hindwards, hind femora well but not strikingly incrassated, with a medium-sized tooth below near tip. Coxæ and femora black, tips of latter narrowly black, rest orange-yellow; tibiæ more or less

blackish towards tips, the colour forming a fairly definite subapical ring on hind pair. Pubescence of legs yellowish or white. *Wings* pale grey, anteriorly pale brown for a short distance; halteres pale orange.

Length, 14–15 mm.

Described from a ♂ and ♀ from Quetta, viii. 1902 and vi. 1903 (*Col. Nurse*), and from a ♂ in the British Museum. A dusty-looking species which cannot possibly be confounded with any other described herein. Originally described from Baghdad. *Type* in Paris Museum.

171. **Merodon albifasciatus**, *Macq.*

Merodon albifasciatus, Macquart, Dipt. Exot. ii, 2, p. 71, pl. xiii, fig. 2, full insect, 2 *a*, head in profile (1842).

♀ "Face with whitish tomentum and pubescence; no black band; frons with yellowish-white tomentum and pubescence, and a green band in the middle. Antennæ with 1st joint black, 2nd testaceous (3rd missing). Eyes with a little grey pubescence. *Thorax* with yellow pubescence and tomentum forming five stripes*. *Abdomen* punctate, nearly bare, somewhat shining black. 1st segment black; 2nd testaceous, with whitish tomentum, hind border with a black band widened in middle; 3rd black with a nearly straight band of white tomentum; 4th with a similar band which is a little bent in the middle†; 5th all black; incisions of segments white. Venter bare; first three segments tawny, last two black. *Legs*: femora black, with white pubescence; front and middle pairs with tawny knees; hind pair a little curved; tibiæ tawny, fore pair yellow at base, hind pair with a black median ring; tarsi tawny. *Wings* a little yellowish, a short appendix on inner side of outer margin of 1st posterior cell. [3rd vein very looped.]

"Indes Orientales." *Length*, 12 mm.

Type in Paris Museum. The species requires absolute confirmation as Indian.

Genus **MALLOTA**, *Meig.*

Mallota, Meigen, Syst. Beschr. iii, p. 377 (1822).
Imatisma, Macquart, Dipt. Exot. ii, 2, p. 67 (1842).
Zetterstedtia, Rondani, Nuov. Annal. Soc. Nat. Bologna, (2) ii, p. 452 (1844).

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* Judging from Macquart's figure, the dorsum of the thorax is better described as yellowish with four longitudinal black stripes.

† In the figure, the pale bands on the 3rd and 4th segments are shown distinctly angulate, especially that on the 4th, which in the middle nearly reaches the anterior margin of the segment, with its two ends nearly on the hind margin.

GENOTYPE, *Syrphus fuciformis*, Fabr., by designation of Rondani, *loc. cit.*

Allied to *Merodon*, but differing in the absence of any process below the hind femora, though a clump of bristles is present. *Antennæ* with 3rd joint deeper than long, placed on a prominence; face cut away considerably below this; central knob and upper mouth-edge moderately produced. *Eyes* bare or hairy, generally contiguous in ♂ in bare-eyed species, rather widely separated in forms with pubescent eyes. *Abdomen* short and rounded, or rather long with nearly parallel sides. *Legs* strong, hind femora much thickened and curved; hind tibiæ considerably thickened and flattened. *Wings* as in *Helophilus*.

Range. Europe, Siberia, Orient, North and South America.

Life-history. *M. eristaloides*, Loew, a European species, lives during the larval stage in hollows in white poplars and other trees.

Some variation is prevalent in this genus in the degree of separation of the eyes in the ♂, of the pubescence or bareness of the eyes, and of the incrassation of the hind femora; all of which seems to suggest the advisability of keeping all the species under one genus. The Palæarctic Catalogue (Kertész) is here followed in treating *Imatisma* as a synonym of *Mallota*. Macquart distinguished the former, which is unknown to me, principally by a difference in the ♂ genitalia.

Table of Species.

Thorax pale yellow; sides of abdomen with whitish pubescence; anterior cross-vein very much beyond middle of discal cell .	*orientalis*, Macq., p. 219.
Thorax dull black; sides of 2nd abdominal segment with bright orange-yellow hairs; anterior cross-vein exactly at middle of discal cell.	*rufipes*, Brun., p. 220.

172. Mallota orientalis, *Macq.*

Imatisma orientalis, Macquart, Dipt. Exot. ii, 2, p. 69, ♂ (1842).

♂. *Head* twice as broad as long. Frons in ♂ very narrow but not linear. Face greatly excavated below antennæ, receding in profile nearly as far back as the eye, descending distinctly below eye in profile, black, with yellow tomentum at sides. Antennæ black, 3rd joint rounded, arista tawny, sub-basal. Eyes bare. *Thorax* subquadrate, pubescent, pale yellow; scutellum comparatively small (according to the figure), black, with yellow pubescence. *Abdomen* shining black; 1st segment, anterior part of 2nd and anterior margin of 3rd with whitish pubescence; 2nd segment as wide as 3rd; hind borders of segments with black hairs. Sides of abdomen with whitish pubescence. *Legs* black;

fore and middle femora with yellowish pubescence below, hind pair very incrassate, with a tuft of black hairs below towards tip. *Wings* yellowish, a brownish spot at base of submarginal cell; trace of an appendix at lowest point of loop in 3rd vein, anterior cross-vein much beyond middle of discal cell.

This description is somewhat a manufactured one, as Macquart merely distinguishes the species by its differences from the one preceding it in his book, namely *posticata*: both of his descriptions are herein drawn upon, whilst a few other (apparently generic) characters appertaining to the head are also added from his figures.

"East India" ("Indes Orientales"). *Type* in Paris Museum.

The species requires definite confirmation as Indian.

173. **Mallota rufipes**, *Brun.*

Mallota rufipes, Brunetti, Rec. Ind. Mus. ix, p. 271 (1913).

♂. *Head*: frons at vertex one-fifth of full width of head, considerably wider at level of antennæ, black, a little shining, with some black hairs, which apparently do not continue as far as the antennæ; ocelli at vertex on the barely perceptibly raised surface. Face moderately produced, wholly black; bare but for a little whitish-yellow pubescence. Antennæ bright yellowish-brown, on a distinct shining black prominence, the tip of which is bright yellowish-brown; 3rd joint grey-dusted, arista bright yellowish-brown, bare. *Thorax* wholly dull black, with thick, long black pubescence; scutellum dull reddish-brown with thick black pubescence. *Abdomen* rather curved, dull black, with thick black pubescence; apical part of 4th segment and whole of 5th with a little grey tomentum. A bunch of very bright orange-yellow hairs towards sides of 2nd segment. Venter dull black, pubescent. *Legs*: coxæ and about basal half of femora black, with black pubescence; rest of legs bright reddish-orange, with thick dense concolorous pubescence. Hind femora almost straight, considerably deepened, with numerous small spines below towards tip; hind tibiæ distinctly but not greatly curved, considerably flattened and moderately deepened. Pulvilli orange, claws orange on basal half, remainder black. *Wings* pale yellowish-grey; apical half a little infuscated, embracing loop of 3rd longitudinal vein; marginal cell obviously but not widely open; anterior cross-vein exactly at middle of discal cell, slightly sloping; anal vein continued straight almost to wing-border. Halteres dull brownish-yellow.

Length, 12 mm.

Described from a single ♂ from Singla, Darjiling District.

The *type* (in the Indian Museum) has been preserved in spirit, and therefore the colours may be brighter in life than herein described.

Genus AZPEYTIA, *Walk.*

Azpeytia, Walker, Proc. Linn. Soc. Lond. viii, p. 113 (1865).

GENOTYPE, *A. scutellaris*, Walk., hitherto the only species.

Body broad, thick. *Head* about as broad as thorax. Frons prominent, eyes in ♂ contiguous for a short space, pubescent. Face only slightly prominent (*scutellaris*), or forming a conspicuous convexity (*bifascia*) to mouth-border, which is only a little below eyes in profile; proboscis short. Antennæ short, 3rd joint elongate-conical, twice as long as 2nd (in *scutellaris*), or oval (*bifascia*); arista bare, sub-basal, very long. *Thorax* normal; suture very distinct, hind corners with a distinct ridge. Scutellum as broad as thorax, with a ridged margin. *Abdomen* longer than thorax. *Legs* robust. *Wings* rather long (*scutellaris*) or of normal length (*bifascia*); marginal cell wide open; 3rd vein curved downward into 1st posterior cell, but not so deeply as in *Eristalis*; apical section of 4th vein bisinuate; anterior cross-vein extremely oblique, much beyond middle of discal cell, slightly curved.

Range. The type-species comes from Papua, the present one from Assam.

Walker's generic description is slightly emended after a comparison of the two species, the genus being quite valid.

174. Azpeytia bifascia, *Brun.*

Azpeytia bifascia, Brunetti, Rec. Ind. Mus. ii, p. 84 (1908); i, pl. xiii, figs. 1–5 (1907).

♂ *Head* black, antennal prominence small; front, vertex and lower part of face with strong black hairs; eyes absolutely contiguous for a short space, slightly diverging towards vertex; antennæ dark brown, arista black, but base very distinctly thicker,

Fig. 42.—*Azpeytia bifascia*, Brun., head in profile.

and distinctly ferruginous; outer ocular orbit with a fringe of short yellow hairs. *Thorax* black, moderately shining, with a rather thick covering of short bright yellow hair, which is, however, invisible if viewed directly from above. This yellow

pubescence extends over the sides also. Scutellum nearly the full width of thorax, tawny, darker at base, covered with thick yellow hair. *Abdomen* black, moderately shining, with very short, rather thick black hair. On the sides of the 2nd segment, a very large pale æneous triangular spot, covered with yellowish-grey hair; extreme edge of abdomen, except just before tip, with a fringe of short bright yellow hair. *Legs* wholly brown, with yellow hair on outer side of all tibiæ, on the coxæ and on hind femora; latter with a fringe of brown hair on more than apical half below. *Wings* yellow, veins tawny-brown, stigma tawny-brown, placed near tip of wing; halteres and tegulæ yellowish-brown.

Length, 14 mm.

Described from the *type* ♂ in the Indian Museum collection, from Margherita, Assam. A second ♂ from Singla, Darjiling District, 1500 ft., iv. 1913 (*Lord Carmichael's collector*).

The inflexed portions of the 3rd and 4th longitudinal veins are considerably curved, exactly as in *Merodon*. *A. bifascia* is closely allied to *scutellaris* but is quite distinct, the differences lying in the rather less prominent face, the æneous spots on the 2nd abdominal segment (which since my description of the species have become very faded), the distinctly broader apical part of the abdomen (which in *scutellaris* is bluntly conical), the yellow pubescence at the sides of the abdomen (which is whitish in *scutellaris*) and the uniformly brown legs, which in *scutellaris* are black with the basal half of the posterior tibiæ yellow.

Genus **AXONA**, *Walk.*

Axona, Walker, Proc. Linn. Soc. Lond. vii, p. 211 (1864).

GENOTYPE, *Eristalis chalcopygus*, Wied., described by Walker as *A. volucelloides*, sp. nov.

Body subfusiform. *Head* prominent, shortly conical, very little

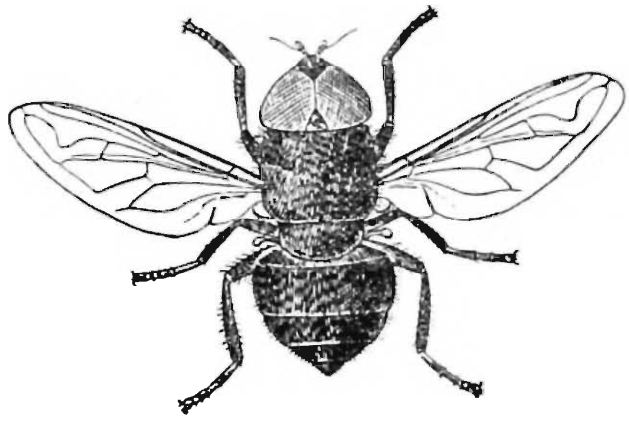

Fig. 43.—*Axona cyanea*, Brun., ♂.

narrower than thorax. Eyes in ♂ very closely contiguous for a long distance, vertical triangle small, frontal space convex,

prominent. Frons in ♀ rather broad, widening gradually from vertex. Face moderately cut away below antennæ; central bump moderately large, mouth-border also prominent: proboscis rather long in the type-species, shorter in *A. cyanea*; labella large. Antennæ very short, 3rd joint round, arista bare. *Thorax* subquadrate, normal. *Abdomen* a little longer than thorax, obconical in *chalcopygus*, nearly conical in *cyanea*. *Legs* rather slender, hind femora without processes or spines below. *Wings* moderately broad (*cyanea*) or narrow (*chalcopygus*); tip rather pointed; 3rd vein deeply looped downward; anterior cross-vein just beyond middle of discal cell, oblique, curved.

Range. The only two known species are Oriental.

175. **Axona cyanea**, *Brun.* (Pl. V, fig. 10.)

Axona cyanea, Brunetti, Rec. Ind. Mus. ix, p. 272 (1913).

♂ ♀. *Head* set closely on thorax. Eyes in ♂ touching for a considerable space, chocolate-brown, upper facets distinctly larger than lower ones. Vertical triangle small, black, with a little black pubescence; ocelli red. Frons rather prominent, brilliantly shining violet, with soft black hairs. Face brilliantly shining violet, distinctly prominent, cut away below antennæ and produced over mouth-opening, provided on each side of the latter with a small blunt point. Mouth-parts concealed, blackish. Antennæ blackish-brown, 1st and 2nd joints short, normal, with a few short bristles, 3rd rounded, dull, with basal brownish-yellow bare arista (the latter under high microscopic power being seen to bear a few pale hairs towards the base). Occiput black, hind border of eyes narrowly margined with grey tomentum. In ♀, head nearly similar to that of ♂, the frons being one-fourth the width of the head, barely wider at level of antennæ; face moderately projecting, with two equal-sized bumps, not extending beyond the antennal protuberance; both frons and face are shining violet-blue. *Thorax*, scutellum and abdomen shining violet-blue, all covered with short stiff black hairs. Venter dark with black pubescence. *Legs* black with violet-blue tinge; hind femora rather flattened and considerably deepened until just before the tip; no bristles or spines are obvious. Hind tibiæ barely curved and with a slight peculiar thickening in the middle. All the legs with short soft black pubescence, tarsi with a little golden-brown pubescence on under side; claws and pulvilli well developed. *Wings* clear, rather pointed, marginal cell almost closed on the border; anterior cross-vein immediately beyond the exact middle of the discal cell, slightly sloping; 6th longitudinal (anal) vein continued almost to the wing-margin, nearly straight. Alulæ large, thoracic squamæ rather large, dirty white with rather thick dark fringe; halteres very small, bright yellow.

Length, 11 mm.

Described from a single perfect ♂, Singla, Darjiling, April

1913, and a ♀ from the Darjiling District, June 1913; both specimens in the Indian Museum. A further ♀ from above Tura, 3900 ft., viii. 1917 (*Kemp*).

This species has very much the appearance of a large *Calliphora*. The head, thorax and abdomen are closely applied to one another, answering to Walker's expression "body subfusiform"; in his "wings acute" is another point of resemblance, and in the purplish-blue colour of the only species previously known, *chalcopyga*, Wied., lies a final point of similarity with *A. cyanea*.

Genus **KORINCHIA**, *Edw.*

Korinchia, F. W Edwards, Journ. Fed. Malay States Mus. viii, p. 39 (1919).

GENOTYPE, *K. klossi*, Edw., *op. cit.*, p. 40*.

Allied to *Eristalis*. Eyes bare, touching for a short space in ♂, rather narrowly separated in ♀. Antennæ set on a prominent tubercle, arista bare. Face considerably hollowed out below antennæ. Scutellum large, with very distinct, flattened margin. Wings entirely covered with a microscopic pubescence; marginal cell closed as in *Eristalis*. The genus differs from *Eristalis* as follows:—Head noticeably flatter; abdomen more elongate; hind femora but little thickened, without any trace of a tubercle on the under side near the tip; the wings have the anal vein distinctly recurrent at the tip, as in *Milesia*, and the loop of the 3rd vein projects diagonally downwards and outwards, while the last section of the 4th vein is rather noticeably curved outwards.

Range. Sumatra, Java, Siam, Southern India.

Life-history unknown.

176. **Korinchia rufa**, *Hervé-Bazin.*

Korinchia rufa, Hervé-Bazin, Bull. Soc. Ent. France, p. 122 (1922).

♂. *Head*: eyes uniformly black, touching for a short distance only; vertical triangle elongate, straight, brown, with reddish dust and some black hairs. Face pale brown with reddish dust; a semicircular spot above the antennæ, the facial bump, tip of mouth-opening and a median facial stripe from the lower side of the eyes to the mouth-opening, are shining brown. Antennal elevation large and prominent, with front margin pale; facial bump small but obvious, rounded, distinct from upper margin of mouth; proboscis thick, dark brown. Antennæ brown; 1st and 2nd joints shining, with some black hairs, 3rd almost rounded, dull, with a light reddish dust; arista long, reddish. Front part

* By an oversight the type-species was not notified. Mr. Edwards informs me that it is *K. klossi*.

of head rather bare, hinder part brownish with short pubescence above, and longer and more reddish pubescence below. Occiput with reddish dust. *Thorax* slightly shining brown, with shining reddish pubescence, which is short on the disc and longer towards the sides; a tuft of long, shaggy, almost golden-red hairs on the supra-alar and post-alar calli. There are three indefinite, nearly golden-red, dust-bands; 1st on anterior margin; 2nd before suture, quite obvious towards sides, nearly absent in middle; 3rd rather indistinct, situated on hind margin. Ventral surface brown with reddish-grey dust and pubescence. Scutellum wholly red, hardly darkened at extreme base, weakly but obviously margined; scutellar pubescence entirely shining red. *Abdomen* long, broad, depressed. General colour brown, slightly shining,

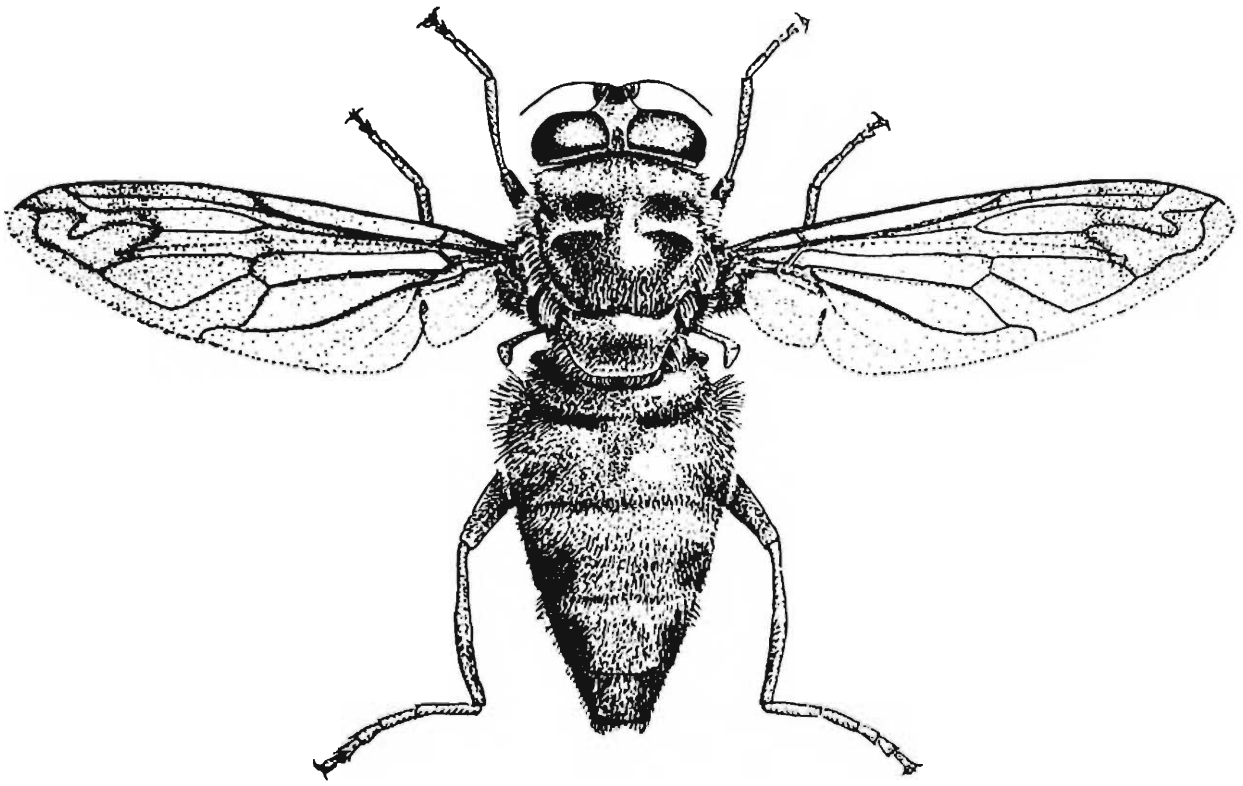

Fig. 44.—*Korinchia rufa*, Hervé-Bazin, ♀.

with reddish dust. 1st segment pale brown, blackish at base with fine, short, reddish pubescence. 2nd segment slightly darker, especially in the median line, with an obscure brown band at the base, interrupted in the middle, and not reaching the sides; an oval black spot on each hind corner; pubescence reddish, short and depressed on disc, longer towards sides, erect, long and shaggy on anterior corners. 3rd and 4th segments dark brown, nearly black in the middle, with depressed reddish pubescence, longer at sides; an oval blackish spot of black pubescence on each hind corner. Hypopygium large, blackish-brown, with brown pubescence. Venter dark shining brown, margins of segments pale. *Legs* robust, reddish, with short reddish pubescence; coxæ frosted with grey. Anterior tarsi with the under

side of the 1st joint, the whole of the three following joints and the base of the last joint, darkened. Posterior * femora with basal half brown, apical half reddish, with some depressed short hair on the under side. *Wings* uniformly pubescent, reddish, indistinctly darkened basally and along a transverse median line, but obviously darkened on the apical third. Veins reddish, brown towards tips. The venation is typical of the genus. Squamæ very small, wholly red, as are also the halteres.

♀. Frons linear, with yellowish-red dust and reddish pubescence, the latter short, fine and sparse. Facial bump less distinct and less well separated from the upper mouth-border. 3rd and

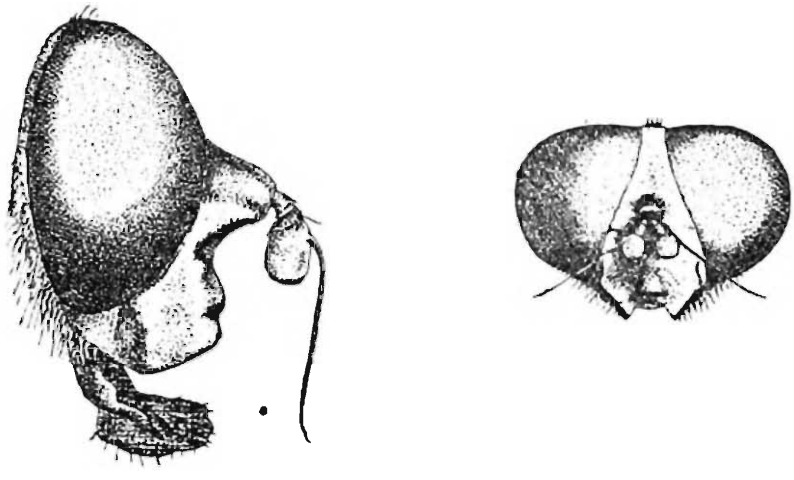

Fig. 45.—*Korinchia rufa*: head of ♀, front view, × 4; head of ♂, side view, × 8.

4th abdominal segments paler, not darkened in the middle; 5th segment shining, reddish in the middle, with black, depressed, shaggy pubescence, especially on the hind margin.

Length, 16–17 mm.

This description is based on that of Monsieur Hervé-Bazin, which was made from a single ♂ and a single ♀ from Kodaikanal, South India, v. 1913. The figures also are reproduced from Hervé-Bazin's drawings. *Types* in his collection.

This species possesses all the characters of *Korinchia*, and is allied to Edwards' three described species. It differs from *klossi* in having the facial bump small and rounded; from *klossi* and *robinsoni* in having the scutellum red, and from *monticola* in having the pubescence of the thorax and scutellum wholly reddish, and in other respects.

Subfamily MILESIINÆ.

Antennæ moderately long, generally pendent, never porrect; arista dorsal, bare (except in two or three genera, *Sericomyia* etc.). Frons prominent, bare or slightly pubescent: eyes generally bare, contiguous or approximate in ♂, wide apart in ♀; face usually bare. Hind femora generally dentate, spinose or

* I do not know whether the original description refers to the third pair of legs only.

serrate. Anterior cross-vein at or beyond middle of discal cell, usually very oblique; 3rd vein generally straight or slightly sinuous, rarely with a loop recalling that of *Eristalis* (some species of *Milesia*).

The MILESIINÆ are essentially a tropical group, the typical genus mainly inhabiting South Asia. But I have never been quite convinced as to the distinctness of the subfamily from the ERISTALINÆ: it rests principally on the course of the 3rd vein, this being only slightly sinuous instead of deeply looped into the 1st posterior cell. The position, too, of some of the genera has been more than once questioned. *Sericomyia* and *Arctophila* are admittedly somewhat aberrant, and Verrall hints at a separate subfamily for them. These two genera are akin by the conically produced frons to both the SYRPHINÆ (through *Rhingia*) and the VOLUCELLINÆ, their conspicuously plumose arista agreeing with that of the latter subfamily and their venation (like that of *Syrphus*) resembling the venation of the former; the anterior cross-vein is at most *at* and not beyond the middle of the discal cell, whilst the abdominal markings are also frequently of the Syrphine type.

Eumerus, too, is somewhat abnormal, the venation and general appearance being very like those of the *Paragus*-group in SYRPHINÆ; both *Paragus* and *Eumerus* are, according to Verrall, probably connected in some way with the smaller aculeate Hymenoptera *.

Table of Genera.

1.	Arista conspicuously plumose .	2.
	Arista bare	3.
2.	Densely pubescent species; abdomen without yellow bands...	ARCTOPHILA, Schin., [p. 289.
	Thinly pubescent species; abdomen with conspicuous yellow bands.	SERICOMYIA, Meig., [p. 291.
3.	Marginal cell closed	MILESIA, Latr., p. 263.
	Marginal cell open.	4.
4.	Anterior cross-vein before middle of discal cell; (hind femora without process below)	MYIOLEPTA, Newm., [p. 228.
	Anterior cross-vein at or after middle of discal cell; (hind femora with or without process below)	5.
5.	Epistome conspicuously produced, snout-like; very densely pubescent species; (hind femora without any process below)	6.
	Epistome not conspicuously produced, never snout-like; face with or without central knob, not more than normally produced at upper mouth-edge; comparatively bare species (except *Brachypalpus*); (hind femora with or without a process below) . .	7.

* Brit. Flies, Syrphidæ, pp. 150, 615: but see also pp. 31, 248 of this present volume.

6. Proboscis very slender, enormously produced, twice as long as the very produced epistome; latter 2 to 3 times as long as width of eyes in profile; venation distinctly abnormal . . .	[p. 276. LYCASTRIS, Walk.,
Proboscis normal, never conspicuously slender nor extremely elongate; epistome very considerably produced (like that of *Rhingia*); venation normal.	[p. 280. CRIORRHINA, Meig.,
7. Densely pubescent species .	BRACHYPALPUS, Macq.,
Inconspicuously pubescent species . .	8.
8. Thorax with conspicuous yellow markings apart from those on humeri .	[p. 275. [et Serv., p. 261. TEMNOSTOMA, St. Farg.
Thorax without yellow markings; or at most on humeri only .	9.
9. Face not cut away below antennæ; outer side of 1st posterior cell distinctly angled	EUMERUS, Meig., p. 248.
Face more or less distinctly cut away below antennæ; outer side of 1st posterior cell not angled as in *Eumerus*	10.
10. Face subcarinate; hind femora conspicuously incrassate	[Serv., p. 244. SYRITTA, St. Farg. et
Face not carinate; hind femora much less conspicuously incrassate	XYLOTA, Meig., p. 231.

Genus **MYIOLEPTA**, *Newm.*

Myolepta, Newman, Ent. Mag. v, p. 373 (1838).
Xylotæja, Rondani, Nuov. Annal. Sci. Nat. Bologna, (2) ii, p. 457 (1844).
Leptomyia, Walker, Ins. Brit., Dipt. i, p. 254 (1851).
Xiloteja, Rondani, Archiv. Zool. iii (*sep.*), p. 9 (1863).

GENOTYPE, *Musca luteola*, Gmel., by original designation.

Head short and broad, rather broader than thorax; eyes bare, contiguous in ♂ for a considerable space, not very widely separated in ♀; face hollowed below antennæ, facial knob conspicuous in ♂, the face retreating again below it before being produced over the mouth; in ♀, the central knob absent, but the lower production of the face is somewhat cut away on its distal extremity*. Antennæ with 3rd joint longer than broad, the nearly basal arista bare. *Thorax* rather strong and arched, narrower in front; scutellum marginate behind; both pubescent, without bristly hairs. *Abdomen* as broad as thorax, ovate. *Legs* rather strong, femora thickened towards tip, serrate below, especially hind pair, without any obvious tooth; all tibiæ slightly curved. *Wings* fairly normal in venation; marginal cell widely open, 3rd vein nearly straight, anterior cross-vein a little before

* See Verrall, Brit. Flies, Syrphidæ, p. 573, fig. 400, ♂, 401, ♀, heads in profile.

middle of discal cell, 1st posterior cell closed a little before wing-border, the last section of the 4th vein nearly straight for its apical three-fourths.

Life-history. A European species has been bred from decaying poplar and maple trees. Lundbeck (Dipt. Danica, v, pp. 486–7, 1916) considers that the larvæ probably feed on the decaying substance in which they live, and that the insect hibernates in the larval stage.

Range. Europe, India, North America, Chili.

A very restricted genus.

177. **Myiolepta himalayana**, *Brun.*

Myiolepta himalayana, Brunetti, Rec. Ind. Mus. xi, p. 233, pl. xiii, fig. 12, head in profile, fig. 13, wing (1915).

♂ ♀ *Head*: ♂, eyes bare; contiguous for only a short space, leaving a rather small vertical triangle, which is shining black, with some yellowish-grey hairs. Sides of frons narrowly grey-dusted, whole of upper part of face also, that is to say, the part immediately below the rather conspicuously produced antennal prominence, which latter is shining black, its extreme frontal edge narrowly orange. Facial bump very large and conspicuous,

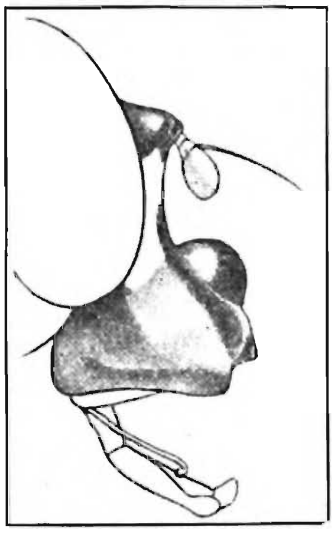

Fig. 46.—*Myiolepta himalayana*, Brun., head in profile.

central knob distinct, not cut away below (in profile), but mouth-opening less projecting; whole protuberance shining black. Lower sides of face with a little grey dust, and a few stiff long hairs near lower corners of eyes. Antennal third joint rounded, the whole organ pale vinaceous, with a hoary bloom, arista bare, orange at base. Back of head shining black, ash-grey behind lower part of eyes, where it is considerably developed, and bearing there a fringe of yellowish hairs. An arc of short bristly brownish-black hairs behind the vertex. In ♀, frons, at level of

antennal prominence, one-third width of head; frons and face mainly shining black, but narrowly grey-dusted at sides, and with a little stripe of very short greyish pubescence along sides from cheeks to mouth-opening. A little grey hair in front of lower corner of eyes as in ♂ Eye-margins present in both sexes as in *Chilosia*. *Thorax* and scutellum æneous-black, with short yellowish-grey pubescence; anterior margin of dorsum, including humeri, a little ash-greyish. A fringe of long yellowish-grey wavy hairs placed transversely in front of the wings. *Abdomen* blackish; 2nd segment nearly wholly orange-reddish, the colour encroaching on base of 3rd segment, whilst in the ♀ the posterior border is also reddish. Extreme tip of abdomen orange-red. Whole abdomen with short greyish pubescence, which is a little longer at the sides. Venter blackish, with grey pubescence, dull orange-reddish for a considerable space about the 2nd segment. *Legs* simple but somewhat strong, the femora having small spines below, towards the tips; black, with fairly dense greyish pubescence. Trochanters, base and tips of tibiæ, orange-yellow; under side of hind tarsi (of which the metatarsus is distinctly though not greatly enlarged) brownish-yellow, upper side of 2nd and 3rd joints brown in ♂. In ♂, first three joints of middle tarsi orange-yellow, as is the whole middle tarsus in the ♀ Exact limits of pale colour in tarsi probably variable. *Wings* pale yellowish-grey, stigma yellowish, subcostal cell, up to the stigma, brownish; a barely obvious suffusion immediately before and below the stigma. Halteres pale orange.

Length, 7–8 mm.

Described from a ♂ and a ♀ in the Indian Museum from Matiana, Simla District (*Dr. Annandale*).

It has been rather difficult to place the present species generically in a satisfactory manner. It has every appearance of a *Chilosia*, even to the eye-margins, which are quite as distinct as in many species of that genus. But *Chilosia* should have no trace of pale markings, so that the almost wholly orange-red 2nd abdominal segment would exclude the present species from that genus. If it be regarded as belonging to the SYRPHINÆ, it works down by Verrall's table of genera to *Chrysochlamys*, a genus which it is totally unlike in facies, in colour, in the shape of the closed 1st posterior cell and in the absence of the thoracic and scutellar bristly hairs. If the exact position of the anterior cross-vein is not regarded as an absolute character (and Verrall doubted its inviolability), the species under review becomes a *Myiolepta*, a genus which Verrall places in the MILESIINÆ, considering its affinities with *Tropidia* to be greater than those with the SYRPHINÆ. He speaks of the genus as of "rather doubtful location." He says the femora are all swollen, and serrate near the tips below, but as Schiner gives the femora as simply "rather thickened" and there seems to be no further discrepancy, the present species is placed here.

Genus **XYLOTA**, *Meig.**

Xylota, Meigen, Syst. Beschr. iii, p. 211 (1822).
Heliophilus, Meigen, Illig. Mag. ii, p. 273 (1803).
Eumeros, Meigen, *loc. cit.*
Eumerus, Meigen, Klass. i, p. xx (1804).
Micraptoma, Westwood, Introd. Class. Ins. ii, Synops., p. 136 (1840).

GENOTYPE, *Musca segnis*, L., by designation of Curtis, Brit. Ent., 1832.

Head generally slightly broader than thorax; eyes bare, contiguous in ♂, widely separated in ♀; face hollowed below the moderate antennal prominence, upper mouth-edge distinctly produced, central knob absent; antennæ with 3rd joint rather large, round or oval, arista bare, sub-basal. *Thorax* oblong, fairly arched, æneous; scutellum concolorous; both finely pubescent. *Abdomen* narrower and much longer than thorax, rather flat, with nearly parallel sides. *Legs* strong; hind femora more or less thickened or lengthened, generally serrulate below; hind trochanters of ♂ often with a process or spine below; hind tibiæ more or less curved, sometimes ending in a distinct spur. *Wings* with the venation of the MILESIINÆ; marginal cell open; 3rd vein nearly straight; anterior cross-vein at or beyond middle of discal cell, very oblique.

Life-history. The earlier stages of some European species are fairly well known, the larvae living in rotting wood. See Lundbeck, Diptera Danica, v, p. 509 (1916).

Range. Europe, North-East Asia, Orient, North and South America, Australia.

Table of Species.

1.	Wings with about apical half blackish .	*dimidiata*, sp. n., p. 232.
	Wings uniformly greyish or yellowish-grey	2.
2.	Femora mainly or wholly orange; anterior pairs always wholly so	3.
	Femora mainly or wholly black . .	6. [p. 233.
3.	Hind femora black except broadly at tip ..	*cupreiventris*, sp. n.,
	Hind femora orange, with a broad black median ring, and the tip black	*annulata*, Brun., p. 234.
	Hind femora almost entirely orange	4.
4.	Abdomen with definite, yellow spots	*ornata*, Brun., p. 236.
	Abdomen without definite spots .	5.
5.	Hind femora almost wholly orange, a blackish median streak above; antennal prominence shorter; thorax with anterior part bearing golden-yellow pubescence which is absent in the median line, giving the impression of a single longitudinal dark stripe; more robust species; abdomen violet-tinged	[p. 237 *assamensis*, Brun.,

* For a table of the Oriental species, see Brunetti, Rec. Ind. Mus. ii, p. 79 (1908).

Hind femora orange; extreme tips black, and a median black broad ring, sometimes incomplete on inner and under side: antennal prominence longer; thorax with two very distinct stripes of golden pubescence; less robust species; abdomen blackish-æneous with dull steel tinge	*bistriata*, Brun., p. 238.	
6. Thorax without trace of dorsal stripes of whitish or yellowish pubescence; (hind tibiæ bright yellow on more than basal half)	*nursei*, sp. n., p. 240.	
Thorax with two obvious dorsal stripes of pale pubescence, always visible from behind		7.
7. Body mainly cupreous, thorax distinctly so; 2nd and 3rd abdominal segments shining brownish-orange, 4th æneous; (hind tibiæ very curved)	*auronitens*, Brun.,	[p. 239.
Body black, with or without a deep blue or violet tinge		8. [p. 240.
8. Head not descending below eyes in profile	*carbonaria*, sp. n.,	
Head very distinctly descending below eyes in profile		9.
9. Length 10 mm.; hind femora normal	*cuprina*, Big., p. 241.	
Length 15 mm.; hind femora laterally compressed on apical half .	*penicillata*, sp. n., p. 242.	

One other species, *æqualis*, Walk. (p. 243), requires confirmation as Indian. It was described originally from the "East Indies." *M. æthusa*, Walk., is a Syrphine, and as the abdomen was missing at the time of description the name may well be dropped.

178. **Xylota dimidiata**, sp. nov.

♀. *Head*: frons at vertex one-fifth the width of the head, widening gradually to nearly one-third at level of antennæ; æneous with a slight green and cupreous tinge and short sparse pale yellow pubescence. Antennal prominence black, extreme tip orange; antennæ black, base of 3rd joint narrowly, and the arista, orange. Face yellowish, blackish along eye-margins with a white shimmer; lower part of head and the proboscis black; occiput black, margin grey-tomentose, practically destitute of pubescence. *Thorax* dull black, closely punctate, with a slight violet tinge; a whitish-tomentose, short, elongate spot on anterior margin, placed on inner side of each humerus. Suture distinct, though not complete, with short white pubescence at ends and yellow pubescence towards centre, where it spreads out a little but is sharply interrupted in the median line. Sides of thorax dull blackish; a little white tomentum on sternopleuræ. Scutellum dull black. Pubescence of thorax and scutellum black, microscopic. *Abdomen* shining cupreous with soft, very short, white pubescence, which is most obvious on 4th segment and at sides of abdomen; traces of a violet transverse band behind middle of 3rd segment; venter

much as dorsum. *Legs*: coxæ black with a little white pubescence; rest of legs brownish-orange with a little white pubescence, which is a little longer on the back of the middle femora. Hind femora with a large black transverse spot below in centre, extending partly up each side and reaching on under side nearly from base to tip; a few short spines below on apical half. Apical third of hind tibiæ black; anterior tarsi, except metatarsi, and hind tarsi wholly, black; latter with yellow pubescence below. *Wings* clear; apical half blackish anteriorly, the colour rather paler posteriorly and sharply demarcated across middle of wing in a line with bases of marginal and discal cells; costal cell clear to tip; halteres brownish-orange.

Length, 10 mm.

Described from a unique ♀ from the Pusa collection, from Dungagali, 8000 ft., Hazara District, 21–24. v. 1915 (*Fletcher*).

Type sent to British Museum. Somewhat like *assamensis*, but the dark apical half of the wing, the conspicuous black streak below the hind femora, and the yellow pubescence along the middle of the suture will easily distinguish *dimidiata*.

179. **Xylota cupreiventris**, sp. nov.

♀ *Head*: frons at vertex one-sixth the width of head, slightly broadening to level of antennæ; at vertex shining black, æneous below, with some yellowish-grey dust and bright yellow pubescence. Antennal prominence black above and at sides, shining, bare; its lower side and the face wholly covered with yellowish-grey dust; cheeks and lower part of head bare, shining, dark brownish-black; proboscis similar. Antennæ rather dark brown; arista orange, apical part black. Occiput with yellowish-grey dust and rather long soft white pubescence on lower part, and short yellow pubescence behind vertex. *Thorax* cupreous-violet; suture rather prominent, with an extremely narrow whitish margin for some distance from sides. Dorsum with dense short orange-yellow pubescence, which in front or side view appears continuous, but when viewed from behind seems to show a median narrow space devoid of pubescence except for an absolutely middle line of extremely fine yellow pubescence. Sides of thorax blackish, a little whitish pubescence here and there, yellow on hinder side of mesopleura. Scutellum concolorous, with dense short yellow pubescence and a few isolated much longer hairs towards hind margin. *Abdomen* brilliantly cupreous when viewed from above, but deep shining violet-black when viewed from behind, with very short dense golden-yellow pubescence, which is, however, not at all conspicuous but is slightly longer and more obvious towards tip of abdomen. 2nd segment with an indistinct black median stripe, and 3rd segment with a small indistinct spot in centre, both only visible if viewed from certain directions. Venter dark with a cupreous tinge and a little pale pubescence. *Legs*: coxæ

and hind femora black, except tips of the latter, which are broadly yellow; rest of legs yellow; middle femora a little darker indefinitely at base and tip; hind tibiæ dark shining brown, paler at base; hind tarsi a little browner above at base. Pubescence of anterior legs very short, whitish; longest on hinder side of middle femora. Hind legs with short yellowish or whitish pubescence. Hind femora moderately and rather uniformly thickened and distinctly compressed on inner and outer sides at tip, with a number of short spines in a double row below near tip. *Wings* very pale grey; stigma just perceptibly yellowish; halteres yellowish; squamæ dirty white, margin brownish-yellow with long dark brown fringe.

Length, 13 mm.

Described from a single ♀ in the Indian Museum from Sureil, Darjiling District, 5000 ft., iv. or v. 1917 (*Kemp*). A very beautiful cupreous species with deep violet reflections and somewhat resembling *assamensis*.

180. Xylota annulata, *Brun.*

Xylota annulata, Brunetti, Rec. Ind. Mus. ix, p. 270, pl. xiv, figs. 11, 15 (1913

♂ ♀ *Head*: ♂, eyes contiguous for half the distance from the black vertex to the face; frons a small triangle with very short grey pubescence below the space occupied by the reddish ocelli. Face black on upper part, yellow on lower part, wholly covered with yellow tomentum, except for the shining black upper side of the antennal prominence. Antennæ rather dark brown, shining,

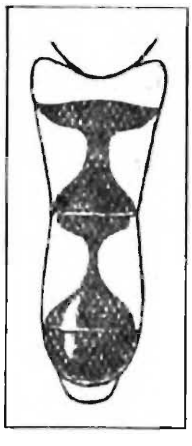

Fig. 47.—*Xylota annulata*, Brun., abdomen.

bare, a few short bristles on basal segments. Mouth-parts blackish-brown. Occiput blackish, a little sparse yellowish-grey hair behind the eye-margins. In ♀, frons less than one-fifth the width of head at vertex, widening distinctly down to antennæ, wholly black, with a little very short bright yellow pubescence which may (apparently) extend over the whole frons except perhaps towards

the vertex. *Thorax* æneous, with a little bronze reflection when viewed from certain angles; two median well-separated stripes of minute bright golden-yellow hairs from anterior margin nearly to scutellum; a little similar hair on shoulders, on hind corners of dorsum and at each end of the suture; shoulders a little yellowish. Sides of thorax black, mesopleura yellowish-tinged with a little bright yellow hair. Scutellum dull æneous-black, margin with a little very short yellow pubescence. *Abdomen*: 1st segment mainly yellowish, rest of dorsum black; on each side of 2nd and 3rd segments a rather vague, subtriangular or semicircular, yellow, almost translucent, spot, extending nearly the length of the side margin, spreading inwards until only a rather narrow median black intervening space is left. 4th segment in ♂ and ♀ shining æneous, brighter in ♀ (?individual variation); 5th segment in ♂ yellow; both 4th and 5th segments in both sexes with a little

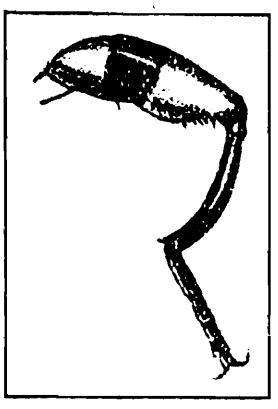

Fig. 48.—*Xylota annulata*, Brun., hind leg.

short bright yellow pubescence, of which there is also a little at the basal angles of the abdomen. The whole yellow part of the dorsum with minute yellow pubescence, of which a little occurs on the venter. *Legs* bright yellow, hind trochanters without process; hind femora exceedingly incrassated (as in *Syritta*), with a broad black median band, widest on upper side, and a narrow black apical band; below near tip bluntly carinate and enlarged, with a number of short black spines of different lengths; hind tibiæ well curved, entirely black; hind tarsi and tips of anterior pairs black. *Wings* pale grey, anterior cross-vein just beyond middle of discal cell and distinctly sloping; stigma pale yellow, halteres yellow, squamæ yellow with yellow fringe.

Length, 11 mm.

Described from a ♂ from Singla, iv. 1913, and a ♀ from Darjiling, 1000–3000 ft., v. 1912. Another specimen from above Tura, 3500–3900 ft., 15. viii–30. viii. 1917 (*Kemp*).

The hind femora are much more incrassated than is normal in *Xylota*, but the species fits into this genus better than elsewhere. It might be placed in *Syritta*, to which its general resemblance is striking, but for the position of the anterior cross-vein.

Types in Indian Museum.

181. **Xylota ornata**, *Brun.*

Merodon ornatus, Brunetti, Rec. Ind. Mus. xi, p. 232, pl. xiii, fig. 11, abdomen (1915).

♂. *Head*: vertex wholly occupied by a moderately elevated æneous-black tubercle, bearing the three reddish ocelli. Frontal triangle small, black, with a little yellowish-grey tomentum. Eyes contiguous for barely one-third of their total height, as viewed from in front. Whole under side of head yellowish, with whitish reflections, except the projecting face, which is shining black; the oral margin very narrowly reddish-brown. Antennæ pale brownish-yellow, the 1st joint the darkest, the 3rd with whitish dust and a pale yellowish, basal, bare arista. Proboscis blackish. Back of head æneous-black, the upper ocular orbit with short yellow hair, the outer and lower ocular orbits with whitish hair. *Thorax*: dorsum dull æneous-black, mainly covered with short yellowish hair, which however takes a golden-brown hue where it forms two moderately broad dorsal stripes; the yellow hair is a little more prominent below the broadly whitish shoulders, behind

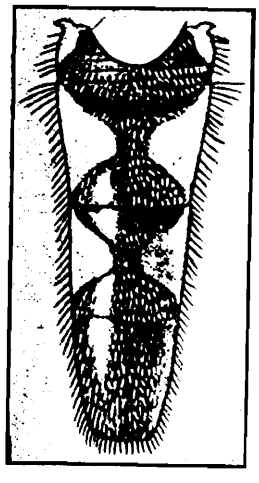

Fig. 49.—*Xylota ornata*, Brun., abdomen.

the wings and on the entire hind margin of the concolorous æneous scutellum. Dorsum of thorax with three indistinct broad blackish stripes, well separated, commencing just behind the whitish shoulders and continued to the posterior margin, the median dark stripe attaining the anterior margin of the dorsum. Between these three indistinct dark stripes the æneous ground-colour is more pronounced, and these spaces bear deeper golden-brown hairs. Under side of thorax blackish, slightly æneous, a patch of white hair between the anterior pairs of legs, immediately below the end of the transverse suture; and a little white hair generally distributed over the ventral surface. *Abdomen* black, moderately shining, with an æneous tinge, which latter is most conspicuous on the unicolorous 1st segment; the 2nd segment has a pair of large yellowish spots, separated by a moderately wide space, and enlarged laterally to the full length of the segment. A similar

pair of spots on the 3rd segment, but narrower at the sides, the colour not there reaching the hind margin. Whole surface of abdomen covered with short bright yellow hairs; at sides, the hair more whitish especially towards base, where it is also longer. Venter mainly black, except on 2nd and 3rd segments, which are yellowish. *Legs*: coxæ black, with a little pale greyish hair, anterior pair grey-dusted; remainder of anterior legs wholly bright pale yellow. Hind trochanters without process, hind femora incrassated, reddish-brown; a few short black spines of unequal length on under side towards tip, the whole limb with short soft yellow hair. Hind tibiæ well curved, yellowish, with a tolerably distinct subapical black band with ill-defined edges, and a trace of a narrower and still less definite sub-basal band; the whole tibia with very short yellowish hair, but on inner side a thick row of very short and stiff black hairs; hind tarsi yellow. Claws, basal half bright yellow, apical half black. *Wings* pale yellowish-grey, stigma brownish-yellow; halteres bright yellow.

Length, 10 mm.

Described from one ♂ in the Indian Museum from Bhowali (5700 ft.), Kumaon District, Western Himalayas, June 1909 (*A. D. Imms*).

This species was described as a *Merodon* through a *lapsus calami*, which by a further oversight was not corrected in my second paper on Syrphidæ. It is very near *X. annulata*, but differs in the entirely reddish-brown hind femora, the brownish-yellow hind tibiæ with just a trace of blackish here and there, and the yellowish hind tarsi with the last two joints brown. Only the *type* specimen is known.

182. **Xylota assamensis**, *Brun.*

Xylota assamensis, Brunetti, Rec. Ind. Mus. ii. p. 79 (1908).

♀ Frons shining black, narrowing towards vertex, a slight trace of a grey pollinose line across centre; face below antennæ tawny, with minute, not very strongly marked, silvery-white pubescence; proboscis blackish-brown; antennæ brown; a fringe of yellowish hair behind eyes at sides. *Thorax* dull violet-bronze, nearly bare, sides black, some yellow hairs in front, at base of wing; scutellum unicolorous, yellow hair at sides and on hind border. *Abdomen* shining purple, nearly bare, but with minute yellowish pubescence when seen from in front. *Legs* bright red-tawny, with very sparse yellow hair; coxæ black; hind femora with traces of a brown mark in middle of upper side, compressed on outer side at tip. *Wings* pale yellowish-tawny, stigma tawny. Halteres brown, alulæ brown with a fringe of thick yellow hair behind.

Length, 13 mm.

Described from one ♀ in the Indian Museum collection, from Kohima, Assam.

183. **Xylota bistriata**, *Brun.* (Pl. V, fig. 13.)

Xylota bistriata, Brunetti, Rec. Ind. Mus. xi, p. 235 (1915).

♂ ♀ *Head*: eyes in ♂ practically contiguous for about lower third of distance from vertex to base of frons. Width of vertex about one-eighth that of head, vertex blackish-æneous with a little pale hair, the small ocelli distinct, reddish. Eyes in ♀ separated by a frons about one-eighth the breadth of the head, widening a little at base of antennæ. Face and frons blackish, covered with yellowish-white tomentum; antennæ covered with yellowish-grey dust; arista black, base brownish-yellow. Occiput blackish-grey, with whitish dust; some bright yellow short hairs along top of head, intermixed behind vertex with black ones. Ocular orbit with a fringe of short white hairs which are longest on under side of head. *Thorax*: dorsum greenish-æneous, with short and rather thick bright yellow pubescence. A pair of well-separated pale median longitudinal stripes bearing short bright yellow hairs, becoming indistinct behind but just attaining the scutellum, which latter is also greenish-æneous with short yellow pubescence and a fringe of short yellow hairs below hind margin. Sides of thorax blackish-æneous, nearly bare; sternopleura and mesopleura with a grey tinge and bearing some short yellow pubescence. Humeri apparently bare; but if viewed from behind they are seen to bear some short yellow pubescence. *Abdomen*: blackish-æneous with a dull steel tinge, which on the 2nd segment in the ♀ may occasionally show, seen from behind, a pale violet reflection; basal segment a little darker; on hind margin of both 2nd and 3rd segments a large dull black (seen from behind) subtriangular spot, its apex reaching nearly to the base on the 2nd segment, but only to the middle on the 3rd segment. Dorsum of abdomen with microscopic dark hairs, sides with short pubescence, which is longer towards the base and is yellowish in the ♂ and white in the ♀. Genitalia in ♂ globular, of a dull steel colour, with some yellow hairs; ovipositor brownish-yellow. *Legs*: coxæ æneous, grey-dusted; hind pair with soft pale hair below. Anterior legs yellowish with short concolorous pubescence, which is longest on inner side of middle tibiæ; tips of middle femora narrowly brown. Anterior tibiæ longitudinally streaked irregularly with brown on inner and outer sides, last tarsal joint brown. Hind femora considerably incrassate, brownish-yellow with a broad blackish-brown median band, sometimes incomplete on inner or under side, and the tips dark brown; hind trochanters with a moderately long distinct black spine; hind femora with an outer row of 6 to 8 black spines of moderate size on under side, gradually diminishing in length distally, and also at the tip an inner row of about four shorter ones of uniform length; with a little long soft pale yellow hair on middle of under side; remainder of hind femora with very short yellow pubescence, which is longest about the middle on the outer side. Hind tibiæ

considerably curved, yellow, with yellow pubescence, inner side mainly black; hind tarsi blackish-brown with pale yellow pubescence; golden-brown minute pubescence below. *Wings* pale grey; subcostal cell pale yellow; halteres pale lemon-yellow; anterior cross-vein barely beyond middle of discal cell.

Length, 11–13 mm.

Described from 3 ♂♂ and 3 ♀♀ in perfect condition in the Indian Museum, from Parambikulam, Cochin, 1700–3200 ft., 16–24. ix. 1914 (*Gravely*); Talewadi, 3–10. x. 1916, and Castle Rock, 11–26. x. 1916, both N. Kanara District (*Kemp*); Kollur Ghat, S. Kanara District, 3000 ft., 18–21. ix. 1913; N. Coorg, S. India, 29. v. 1918, on coffee flowers, "I.R. No. 54" (*Newcome*).

184. **Xylota auronitens**, *Brun.* (Pl. V, fig. 12.)

Xylota auronitens, Brunetti, Rec. Ind. Mus. ii, p. 78 (1908).

♂. *Head*: vertex shining black, a few yellow hairs immediately above junction of eyes, which are contiguous for only half the distance from the frontal prominence to the crown of the head; facets small, of uniform size, except for being a little larger where the eyes touch; ocelli distinct, no ocellar prominence; frons shining blue-black, grey-dusted round the margins, with lower edge immediately above the antennæ, tawny; cheeks and lower part of face blackish, with a brownish-blue tinge, with whitish reflections in certain lights. Antennæ reddish-brown, 3rd joint lighter, whitish-dusted; arista reddish-brown. Mouth and proboscis brown. Back of head grey, encompassed by a fringe of gold-yellow hair, which is shortest behind the upper corners of the eyes. *Thorax*: dorsum golden-brassy, with gold-yellow hairs, which are absent in the centre, giving an appearance, seen from behind, of a dark dorsal stripe. Humeral calli bluish-black with a few yellow hairs. Sides of thorax blackish, shining, with some scattered yellow hairs. Mesopleura, pteropleura and sternopleura æneous-grey, shining, with yellow hairs. Metanotum æneous, bare. Scutellum brassy-gold, with rather close, moderately short, yellow hair. *Abdomen*: 1st segment æneous, with a slight brassy tinge; 2nd, tawny-brown, shining, posterior border a little blackish, the colour extending indefinitely forward in the centre as a partial dorsal stripe; 3rd, tawny-brown, shining, posterior part blackish, this colour widest in the centre; 4th, æneous-shining, reddish-brown towards posterior border; tip of abdomen reddish-brown. Venter red-brown, black at base. The whole abdomen—dorsum, sides and venter—is covered with short, soft yellow hair. *Legs*: coxæ shining æneous-black, hind pair with a slender spur, sides with yellow hair; femora æneous, with soft yellow hair on upper and under sides, extreme tips tawny; hind pair with a long row of distinct, fairly large, spines on outer under side, and a second, inner row of four similar spines; tibiæ and tarsi bright tawny with yellowish pubescence, apical half of

tibiæ blackish, especially in fore and hind pair, the fore tibiæ bearing a fringe of long yellow hair on their inner sides. *Wings* pale grey, mediastinal cell uniformly brownish-yellow; no distinct stigma. Halteres bright yellowish-red. Tegulæ whitish-grey.

Length, 12 mm.

Described from a single ♂ in good condition in the Indian Museum collection from Margherita.

This species must be very near *nigroœnescens*, Rond., but his description of the abdomen does not quite agree, and he says that the antennæ are black, whereas in *auronitens* they are bright reddish-brown.

185. **Xylota nursei**, sp. nov.

♂. Very like *auronitens* in general appearance but structurally distinct. The structural differences are as follows:—The hind trochanters bear a short blunt tooth in *nursei* instead of a slender spur as in *auronitens*; the hind tibiæ are barely curved, instead of well curved, especially on the inner side; the hind femora have a double row of very small spines on the outer under side, with numerous additional spines, also a row of 8 or 9 much longer spines on inner under side on apical half. In *auronitens* the hind femora have a row of distinct spines a little stronger than usual, on nearly the whole length on the outer under side, with a second row of four similar spines near the tip. In *nursei* the vertical triangle is equilateral, barely longer than the approximate length of contiguity of the eyes, but in *auronitens* the vertical triangle is elongate and relatively distinctly longer. The non-structural differences are as follows:—The abdomen is black-æneous, with the 2nd segment and basal half of the 3rd shining dull orange, instead of cupreous with violet reflections (*auronitens*); the frons and face are densely covered with bright yellow tomentum, instead of shining blue-black, with whitish dust; and the wings are wholly grey instead of having a yellowish tinge.

Length, about 12 mm.

One ♂, Simla, viii.1898 (*Col. Nurse*).

Type presented by Col. Nurse to British Museum.

186. **Xylota carbonaria**, sp. nov.

♂ *Head*: eyes contiguous for nearly one-third of the distance from upper angle of frons to hind margin of head; vertical triangle shining black, with a little brownish pubescence; frons and face whitish-dusted, without obvious pubescence. Antennæ orange, 1st and 2nd joints blackish. Proboscis black. Occiput grey-dusted, with a little short white pubescence on lower part. *Thorax* and scutellum finely punctate, black, with inconspicuous, depressed, golden-yellow pubescence, with also (seen from behind) two well-separated whitish dust-stripes from anterior nearly to hind margin. Pleuræ moderately shining black, with grey dust;

mesopleura with minute stiff black hairs and obvious greyish pubescence. Scutellum concolorous with thorax, with very short, whitish pubescence. *Abdomen* dull black, finely punctate; 1st segment æneous; 2nd towards each side with traces of a large æneous spot; 3rd and 4th with an apparent tendency to similar coloration; hind margin of 4th segment rather narrowly orange-brown. Genitalia concealed, rounded, brown, twisted sideways, with dense short soft brown pubescence. Pubescence of abdomen short, inconspicuous, mainly yellow but white towards sides, and longer towards sides of 2nd segment. Venter black, 2nd segment dull brown. *Legs* rather short, black; hind trochanters without spur; anterior tibiæ brownish-yellow, a little paler at base and tip; anterior tarsi yellowish; hind tibiæ and tarsi black, tips of former narrowly whitish. Pubescence of legs rather inconspicuous, mainly whitish on femora but yellow towards tips of hind pair, pubescence of tibiæ and anterior tarsi white and obvious. *Wings* grey, stigma distinct, dark brown; halteres conspicuously yellow.

Length, 8 mm.

Described from 2 ♂ ♂ from Shevaroys, Yercaud, 23. iv–4. v. 1913 (*Fletcher*).

Type in British Museum.

187. Xylota cuprina, *Big.*

Xylota cuprina, Bigot, Ann. Soc. Ent. France, (6) v, p. 247, ♂ (1885).

♂ ♀ *Head*: eyes in ♂ touching for a distance about equal to length of frons, the facets near point of approach slightly larger; vertical triangle brilliantly metallic-blue with soft pale hairs, lower part with a little grey pubescence; ocelli ruby-red. Antennal prominence abruptly projecting, shining black, front edge brownish-orange; antennæ dark brown, tip of 2nd joint orange, 3rd grey-dusted; arista orange-brown. Face black, closely grey-dusted, only a little prominent at upper mouth-edge. Occiput black, grey-dusted, lower margin with short grey pubescence. In ♀, frons a little narrower below than at vertex, at base of antennæ forming one-fifth of the head; shining black, with bluish reflections and whitish dust. *Thorax* shining black with more or less violet and cupreous reflections; punctate; a whitish dust-spot on inner side of each humerus; traces of a pair of yellowish tomentose stripes from anterior margin, well separated, which (apparently) do not attain hind margin; pleuræ moderately shining black, a tomentose whitish stripe extending from in front of wing-base over mesopleura and sternopleura. Scutellum blue-black; punctate, shining, sometimes with a cupreous tinge. *Abdomen* moderately shining indigo-black, or with distinct violet reflections; 4th segment towards apex, and 5th, often cupreous; 2nd and 3rd with blackish hind margins,

widened in the middle; 4th with a little whitish pubescence. Venter dull black. *Legs* mainly black; hind trochanters in ♂ with a slender spur; tips of anterior femora narrowly, base and tips of anterior tibiæ, also the anterior tarsi, brownish-yellow; hind femora black, distinctly and uniformly incrassate, with a double row of about 9 or 10 small black spines below; hind tibiæ and tarsi brown; base of tibiæ yellowish. Pubescence of legs short, whitish. In ♀, hind femoral spines fewer and placed only towards tip. *Wings* yellowish; stigma brown; halteres orange.

Length, 10 mm.

Described from 1 ♂ and 2 ♀ ♀ in fairly good condition in the Indian Museum, and identified as this species by Bigot. Margherita, Assam. Originally described from "Indes."

188. **Xylota penicillata**, sp. nov.

♂. *Head*: eyes practically but not absolutely contiguous for nearly one-third of the distance from upper angle of frontal triangle to vertical margin; vertical triangle shining blue-black, with short brownish-yellow inconspicuous pubescence; ocelli dark red. Frons and face without obvious pubescence, both covered with white dust except above antennæ, where the surface is shining black with a little dark blue tinge. Antennal 1st and 2nd joints blackish, 3rd dull brown. Occiput grey-dusted, with whitish pubescence on lower part and with a very short marginal fringe. *Thorax* shining deep blue-black, finely punctate and with very short inconspicuous yellow pubescence; pleuræ all white-dusted, with longer whitish pubescence on mesopleura and sternopleura; scutellum shining blue-black, finely punctate, with whitish pubescence. *Abdomen* shining dark brown, with hind margins of 2nd and 3rd segments broadly, and 4th segment wholly, of an indistinct deep blue tinge. Pubescence short but obvious, whitish, longer towards sides, black on hinder parts of 2nd and 3rd segments and over whole of 4th. Venter pale brownish-yellow, nearly bare. *Legs*: fore pair dark shining brown, with slight white pubescence, longest on outer side of femora and tibiæ; knees narrowly, tips of tibiæ, and tarsi except tips, pale orange. Middle legs relatively rather longer, coloured as fore pair, middle femora with a distinct blunt tooth below near base, pubescence longer than on fore pair, dense, whitish, but very short on upper side of femora and outer side of tibiæ, long on outer and under sides of metatarsi. Hind legs abnormally shaped; trochanters with a long, black, slender spur directed backwards, parallel with under side of body; femora considerably thickened in basal half, compressed towards tip, inner side rather flattened, under side rather enlarged downwards in middle, bearing there about six black spines and a bunch of long, rather coarse, yellowish hair; two rows of fairly strong black spines on under side near tip, six in outer, four in inner, row; a number of

similar spines on upper outer side. Tibiæ blackish-brown, distinctly curved, narrowly yellowish at base; hind pair ending on inner side of tip in a very small tooth; on outer side, just beyond middle, is a curious, small area of roughened surface (which apparently meets the spines in the middle of the under side of the femur when the legs are closed); tarsi entirely dark brown. Pubescence of hind femora moderately long, mainly confined to upper and lower sides, brownish and greyish; that of hind tibiæ whitish, short except on about middle third of inner side and over the roughened space; that of tarsi whitish, short except on outer side of metatarsi, where it is white and very obvious, and on inner side, where it is rich brown-yellow. *Wings* uniformly moderately dark grey; stigmatic region moderately dark brown; halteres orange.

Length, 15 mm.

Described from two ♂ ♂ in the British Museum. Lower Ranges, Khasi Hills, Assam, 1878 (*Chennell*).

This insect is clearly distinguished from all other Indian species, (i.) by the presence of the tooth on the under side of the middle femora, (ii.) by the spines on the upper outer side of the hind femora, and (iii.) by the roughened surface on the outer side of the hind tibiæ.

189. **Xylota æqualis**, *Walk.*

Xylota æqualis, Walker, Ins. Saund., Dipt. i, p. 226 (1852).

"♂ Head pale buff, clothed with pale yellow hairs; crown clothed with black hairs; a pitchy stripe along the face, which has a bare shining ferruginous knob near the epistoma; mouth pitchy; feelers black; third joint pitchy at the base; eyes bronzed; facets larger on the crown than elsewhere; chest and breast hoary, thickly clothed with pale yellow hairs; chest with a brassy tinge; scutcheon tawny, clothed with black hairs; abdomen black, obconical, tinged with blue on the hind borders of the segments, much longer than the chest, clothed with black hairs, adorned with six bands; first, second, fourth and sixth bands tawny, fourth indistinct, third and fifth whitish; legs tawny, clothed with short tawny hairs; thighs towards the base darker and clothed with darker hairs; claws and foot cushions tawny; tips of the claws black; hind legs dark tawny or pitchy, their thighs, shanks, and the first joints of the feet thickly fringed with black hairs; wings colourless; wing-ribs, veins, and poisers tawny.

"Length of the body 6 lines; of the wings 12 lines. East Indies."

This species requires confirmation as truly Indian; the *type* is not to be found, nor has the species been recorded since its description.

Genus **SYRITTA**, *St. Farg. et Serv.* *

Syritta, St. Fargeau & Serville, Encycl. Méth. x, p. 888 (1825).
Coprina, Zetterstedt, Ins. Lapp., Dipt., p. 584 (1838).
Xylota, Westwood (*nec* Meigen), Introd. ii, Synops., p. 136 (1840).
Planes, Rondani, Archiv. Zool. iii (*sep.*), p. 9 (1863).

Genotype, *Musca pipiens*, L., by original designation.

Closely allied to *Xylota*, from which it is distinguished by the anterior cross-vein being placed at the middle of the discal cell and perfectly upright. Face with a central keel. Second segment of abdomen projecting backwards at the sides, bearing a peculiar fringe of hairs at its most produced portion. Hind femora extremely incrassated, much more so than in *Xylota*, with short rigid spines below and often with characteristic markings.

Life-history. The larva of *S. pipiens*, L., lives in horse- or cow-dung: the early stages of this species have been known for a long period (see Lundbeck, Dipt. Danica, v, p. 528, 1916). Terry (Proc. Hawaiian Ent. Soc. ii, p. 96, 1910) describes and illustrates the life-cycle of *S. oceanica*, Macquart; oviposition in this species was observed to occur under the loose bark of a twig lying among rotting fruit and other decaying vegetable matter, and the larvæ fed on a similar medium.

Range. Practically world-wide, the insects occurring almost anywhere amongst flowers and leaves, in hedges and fields; the ♂ ♂ are frequently seen hovering.

The exact number of species of *Syritta* in the East is a moot point, but with a few exceptions all the numerous specimens examined by me may be embraced by three forms, which may tentatively be regarded as of specific rank, and may be separated thus:—

Table of Species.

1. Hind femora with a moderately narrow *complete* orange ring at base; a more or less incomplete ring or streak of varying width on under side near middle. Abdominal spots in ♂ on 2nd and 3rd segments definitely separated by a moderately wide median black stripe . . . . . *pipiens*, L., p. 245.
2. Hind femora normally wholly black, but sometimes very narrowly pale at extreme tip, and occasionally just perceptibly so at extreme base; frequently with upper side practically wholly black, and basal half (or thereabouts) below brownish or orange; with or without an additional streak at middle of under side (as in *pipiens*). Abdominal spots in ♂ on 2nd and 3rd segments normally united to form two complete bands, or at most the dividing black line is very narrow or incomplete. (In specimens with entirely black femora the abdominal spots are more widely separated.) . . . . . *orientalis*, Macq., [p. 246.

* For preliminary notes on Oriental species, see Brunetti, Rec. Ind. Mus. i, p. 77 (1908).

3. Differing from *orientalis* only in the orange or pale brownish basal one-third to two-thirds of hind femora, the rest of which are black. Abdominal spots on 2nd and 3rd segments in ♂ often forming two unbroken bands; when in the form of spots, the dividing black line much narrower than in *pipiens* *rufifacies*, Big., [p. 247

In the ♀ ♀ of all the species the abdominal spots are always more definitely separated than in the ♂ ♂ Dr. de Meijere ranks *rufifacies* as synonymous with *orientalis*, and I have seen more than one intermediate specimen; but if these two are considered a single species, then it is probable that all the forms recorded from the East may be simply synonyms or varieties of *pipiens*. *S. amboinensis* may possibly be distinct through the alleged dark rings on the anterior legs, but traces of such rings have been recorded in specimens of both *pipiens* and *orientalis*. *S. luteinervis*, de Meij., rests, as a species, wholly on the paleness of its venation.

190. Syritta pipiens, *L.* (Pl. V, figs. 14, 15.)

Musca pipiens, Linnæus, Syst. Nat., Ed. x, p. 594 (1758).
Syritta pipiens, auctt.; Verrall, Brit. Flies, viii, p. 612, figs. 416, 417 (1901).
Eumerus indicus, Wiedemann, Anal. Ent. p. 33 (1824).
Xylota indica, Wiedemann, Auss. Zweifl. ii, p. 103 (1830).
Xylota proxima, Say, Amer. Entom. i, p. 16, pl. viii, fig. 3 (1824).

♂ ♀. *Head*: vertical triangle elongate, blackish round the ocelli, lower part yellow-dusted, the whole with pale hairs; frontal triangle small, hardly produced, bare, dusted with yellowish-white. Eyes in ♂ contiguous for a moderate space, front facets larger than others; frons in ♀ one-sixth width of head, linear above, slightly widening below, vertex shining black, below this a yellowish-white dust-spot, sometimes divided into two, below this again a bare shining black spot, thence dusted with yellowish-white to antennæ, but the facial dust often white; a little whitish or pale yellowish pubescence near the eyes. Antennæ orange, sometimes brownish in ♀, arista blackish, bare. Occiput black, with a narrow white tomentose margin; this latter disappears in the neighbourhood of the vertex except for two short spaces which stand out rather conspicuously as elongate small white post-vertical spots. *Thorax* dull black; humeri and sides of dorsum as far as suture, and pleuræ, wholly yellowish- or whitish-grey; traces of two short whitish stripes on anterior margin of dorsum; posterior calli greyish. Pubescence very short and sparse, adpressed, pale. Scutellum flat on disc, slightly margined at the tip, which bears a few tiny, inconspicuous bristles. *Abdomen* dull black, 1st segment grey at sides; 2nd with a large yellowish spot on each side; these spots have their inner sides convex, and extend forward a little on the anterior corners, where the segment itself is much produced, and where it has at its junction with the 1st segment a fan-shaped bunch of

outstanding white hairs; hind margin of segment black. 3rd segment with a similar pair of spots, but they are usually smaller and are more or less distinctly separated in ♂, always distinctly separate in ♀; hind margin of segment wholly black. 4th segment shining black, at each basal corner with a small grey spot which extends some way down the margin and continues over the side; hind margin orange. All the spots in the ♀ usually smaller and more whitish than yellowish. Genitalia in ♂ rather large, shining black, basal section globular, with minute white hairs but not grey-dusted. *Legs*: coxæ whitish-dusted, hind trochanters shining black, with tiny spines; anterior legs mainly orange, upper side of femora, and tips of tibiæ, sometimes blackish. Hind femora extremely incrassate, serrate below, the serration being on the apical third situated on a ridge; three or four distinct small spines near tip; generally shining black, orange narrowly at base, and with an incomplete orange streak or ring of varying width on under side about the middle. Hind tibiæ black, base and a ring beyond the middle, orange; tarsi orange. Legs in ♀ more orange than in ♂. *Wings* clear, subcostal cell and stigma pale brownish-yellow; squamæ and halteres pale yellow.

Length, 8 mm.

Described from a number of both sexes from various sources.

This species is common and generally distributed in both hills and plains in India. I have taken it myself at Mussoorie, Darjiling and localities in the plains. Examples in the Indian Museum are from Mussoorie, Simla, Naini Tal and Agra. A widely distributed species: Europe, Asia, Africa, Madeira and Canaries, North America.

191. **Syritta orientalis**, *Macq.* (Pl. V, figs. 16, 17.)

Syritta orientalis, Macquart, Dipt. Exot. ii, 2, p. 76 (1842); de Meijere, Tijd. v. Ent. li, p. 224, ♂ ♀ (1908).
Syritta illucida, Walker, Proc. Linn. Soc. iv, p. 121 (1860).
Senogaster lutescens, Doleschall, Nat. Tijd. Ned. Ind. x, p. 410, pl. xii, fig. 3 (1856).
? *Syritta amboinensis*, Doleschall, op. cit. xvii, p. 97 (1858).

This species differs from *S. pipiens* by the abdominal spots on the 2nd and 3rd segments being united to form respectively two complete transverse bands, or else separated by an indefinite, very narrow, median black stripe on each segment. In many cases, however, this median stripe is distinctly present and complete, more especially in those specimens with wholly black hind femora, and this fact tends to break down the barrier between *orientalis* and *pipiens*.

In specimens in which these median stripes are absent or very indefinitely present, the hind femora are orange or brownish on a considerable part of the under side up to the middle, where there may or may not be an orange streak as in *pipiens*; but the whole

upper side of the hind femora should theoretically be black, though as a matter of fact it is sometimes pale narrowly at base or tip, or both. Two varieties of this species may therefore be accepted, but intermediate forms occur; one such form, with the abdominal spots united into two orange cross-bands, possessing hind femora with the basal half below orange, the upper side generally wholly black, or at most narrowly pale at base and tip; and a second, more nearly typical form, with the abdominal spots separated almost as widely as in *pipiens*, and with practically wholly black femora.

As to the synonymy of the species cited above, there seems no reasonable doubt. Walker's description of *illucida* has not a word in it that will not apply to *orientalis*, his remark about the two white spots behind the vertex being almost conclusive proof of the identity of the two species, as the whitish margin of the occiput ceases on each side a little before the vertex and again at the vertex itself, thus isolating the two small white spots to which he alludes *. *S. amboinensis* differs only in the anterior legs being ringed, and as specimens referable to both *pipiens* and *orientalis* have sometimes obscure streaks or traces of such rings, Doleschall's species is probably one of these forms with legs more darkly marked than usual. Dr. de Meijere sinks *Senogaster lutescens* as synonymous, and both the description and figure given by Doleschall support this view.

In the Indian Museum are two ♂♂ under the name of *laticincta*, Big., a MS. name only. It is not certain whether both specimens were attributed by that author to this so-called species, but the example bearing the label in his handwriting is the variety of *orientalis* with cross-bands and partly orange hind femora, whilst the other example is the variety with wholly black femora, but possessing abdominal cross-bands as in the first variety. The second specimen therefore partakes of both varietal forms and serves to prove their specific unity.

I have seen *orientalis* from Pusa, x. 1907 and 30. iii. 1914; Chapra, Bengal; Katihar; Kushtea, Bengal; Sukna; Calcutta; Port Canning; Mergui. De Meijere records it from Singapore and Java.

192. Syritta rufifacies, *Big.* (Pl. V, fig. 18.)

Syritta rufifacies, Bigot, Ann. Soc. Ent. France, (6) iii, p. 538 (1883).

This so-called species differs from *pipiens* and *orientalis* by the hind femora being wholly orange or brownish for from one-third to two-thirds of their length from the base, while the rest is black. The abdominal spots on the 2nd and 3rd segments are normally united, as is frequently the case in *orientalis*; but a median line dividing them more or less distinctly into spots is not infrequently present, and when the orange colour of the hind femora is

* Subsequent examination of Walker's type, a ♀, has proved the identity of *illucida* and *orientalis*.

darkened to brown, the specimens closely approach *orientalis*, with which de Meijere considers *rufifacies* synonymous. The region of the mouth-border is in some specimens brownish-orange.

Bigot's original description was made from a single example in his collection from Pondicherry. The remarks tendered above are based on several in good condition in the Indian Museum from Katihar; Satara District; United Provinces; Port Canning; Calcutta; Bangalore; Mangaldai, Assam; Rangoon.

Genus **EUMERUS**, *Meig.*

Eumerus, Meigen, Syst. Beschr. iii, p. 202 (1822).

GENOTYPE. If no species has been already selected, I suggest *Pipiza strigata*, Fabr.*

Head broader than thorax; eyes more or less pubescent, sometimes almost bare, contiguous in ♂ for a distance varying from a long space to little more than a point, sometimes very narrowly yet distinctly separated; wide apart in ♀; face rather flat, central knob absent. Antennæ variable, generally short, but large; 3rd joint rounded or ovate, or occasionally elongate, usually larger in ♀; arista bare, 3-jointed, placed before middle of joint. *Thorax* subquadrate, slightly arched, usually æneous-black with short pubescence; scutellum concolorous, the actual margin occasionally serrulate. *Abdomen* longer than wide, sides usually parallel or slightly widened about the middle; nearly always with three pairs of pale lunules; tip blunted in ♂, more pointed in ♀; pubescence short. *Legs* moderately strong, hind femora thickened, with short stout bristles below; hind tibiæ usually slightly curved; hind metatarsi generally incrassate and in some species the succeeding joints also conspicuously dilated. *Wings* with marginal cell widely open; anterior cross-vein at or beyond middle of discal cell; 3rd vein often sinuous, sometimes looped like that of *Eristalis*; 1st posterior cell closed some distance from border by the recurrent and angulated upturned tip of 4th vein, which usually bears a short appendix at the angle; apical portion of 5th vein rather more upright than usual.

Life-history. E. strigatus, Fln., and *E. tuberculatus*, Rondani, have been bred in Europe from onions and various other bulbs. These two species have comparatively recently come to be regarded as serious pests of Narcissus in Great Britain, and are sometimes known as the "small Narcissus Flies." Their life-history, together with that of *Merodon equestris*, Fabr., the "large Narcissus Fly,"

* Verrall insists on retaining the name *Eumerus* in the sense in which it was used by Meigen in his standard work in 1822, and not as tentatively used by him, under the form *Eumeros*, in 1803. Coquillett uses it in Meigen's earlier sense. As adopted here it has been known by all dipterologists for nearly a century, but no type-species has been to my knowledge definitely set up.

is dealt with in Leaflet no. 236 issued by the Ministry of Agriculture, London, revised August 1921.

Range. Europe, Asia, Orient, N. Africa, Cape, Hawaii, North America. The genus seems somewhat addicted to islands, appearing in the Canaries, St. Helena, Rhodes, Sokotra, and the Nicobars.

The genus seems to be allied to *Merodon* in the ERISTALINÆ and certainly to *Xylota* in the MILESIINÆ. Its species possess a remarkable general resemblance to one another, and some care is required to separate them with certainty. All those admitted herein are, I feel convinced, quite valid, as I have had the advantage of having specimens of them all before me. The principal characters of differentiation appear to be the degree of contiguity or approximation of the eyes in the ♂; their pubescence in both sexes; the fine white stripes on the thorax; the coloration of the hind margin of the scutellum, and the dilatation or incrassation of the hind tarsi in the ♂. De Meijere (Tijd. v. Ent. li, p. 214, 1908) notes and tabulates some Oriental species, and various notes have been given by me (Rec. Ind. Mus. xi, p. 239, 1915).

Table of Species.

1. Wing-tip distinctly infuscated. Hind tarsi, including metatarsi, presumably not dilated, elongate, wholly snow-white except at extreme base of 1st joint — *nicobarensis*, Sch., [p. 251.
   Wing-tip entirely clear — 2.
2. Antennæ orange or yellow — 3.
   Antennæ black or nearly so . . . — 4.
3. Eyes wholly with dense bright yellow pubescence. Length 5–6½ mm. . . — *aurifrons*, Wied., p. 252.
   Eyes with very sparse whitish pubescence on lower part only. Length 8 mm. . — *nepalensis*, Brun., p. 253.
4. Scutellum with hind margin pale, coloured differently from remainder and from thorax . . . . . — 5.
   Scutellum concolorous with thorax — 8.
5. Scutellum with conspicuous dense orange-yellow pubescence . . . . . — 6.
   Scutellum with grey pubescence (brownish-yellow in *albifrons*), concolorous with that of thorax . . . . . — 7.
6. Eyes bare: contiguous in ♂ for some distance. No æneous large spots at base of abdomen; all three pairs of spots very narrow and subequal. Length 12 mm.. — *rufoscutellatus*, Brun., [p. 254.
   Eyes densely pubescent. A pair of very large æneous spots on anterior corners of 2nd abdominal segment, with a pair of narrow greyish spots superimposed thereon; the pairs of spots on 3rd and 4th segments narrow and grey as usual. Length 7 mm. . . . — *pulcherrimus*, Brun., [p. 255.

7. Eyes absolutely contiguous in ♂ for some distance. 2nd antennal joint about two-thirds the length of 3rd; 3rd much longer than broad, but only a little wider than 2nd. 4th abdominal segment with no trace of a narrow median stripe, but with the usual two curved spots only. Length 5 mm.	*albifrons*, Walk., p. 257.
Eyes approximate only in ♂, their point of approach angular. Antennæ distinctly elongate *; 2nd joint nearly as long as 3rd; 3rd much longer than broad, barely wider than 2nd. 4th abdominal segment with a median very narrow stripe extending to tip of abdomen; the usual pair of spots nearly straight and perpendicular. Length 5½ mm.	[p. 258. *pulverulentus*, sp. n.,
8. Scutellum cupreous; in contrast with black shining abdomen	9.
Scutellum not cupreous; not in contrast with either thorax or abdomen	10.
9. Thorax only slightly cupreous; narrower, more slender species. Length 5-6 mm.	[p. 258. *halictoides*, Brun.,
Thorax shining cupreous; a more thickly set species. Length 7 mm.	[p. 256. *æneithorax*, Brun.,
10. Thorax, scutellum and abdomen distinctly shining blue-black. Length 7 mm. . ..	11.
Thorax, scutellum and abdomen dull black, barely shining; without any bluish tinge. Length 8 mm.	[p. 260. *sexvittatus*, Brun.,
11. Third antennal joint slightly pale on inner side. Abdomen shining æneous-black with white pubescent spots; middle tibiæ brownish-yellow on basal half and on inner side; hind tarsi brown. Wings vitreous. Length 7 mm.	[p. 260. *perpensus*, Brun.,
Third antennal joint uniformly blackish. Abdomen deeper blue-black, with pubescent spots more distinct; middle tibiæ and tarsi wholly orange; hind tarsi more orange. Wings grey. Length 7 mm. .	*perplexus*, Brun., p. 261.

This table of species, though it does not by any means satisfy me, illustrates in a general way the affinities of the species, with the exception of *æneithorax*. The four first species bear a considerable resemblance one to another, by the first pair of abdominal spots being larger than the others and more or less rounded instead of lunate. *E. rufoscutellatus*, *pulcherrimus* and *æneithorax* form a second group with a conspicuous, cupreous or æneous thorax and scutellum, the latter with dense orange or yellow pubescence. The remaining species form a group with more normal markings, that is to say, possessing blackish or greyish bodies with three pairs of greyish curved or lunate spots placed

* Longer than in any other species in this table.

diagonally on the 2nd, 3rd and 4th abdominal segments. Of these, *pulverulentus* is easily recognised by the elongate antennæ, whilst *sexvittatus* separates easily from the remainder by its somewhat greater size.

193. Eumerus nicobarensis, *Sch.* (Pl. VI, fig. 1.)

Eumerus nicobarensis, Schiner, Reise Novara, Dipt., p. 368 (1868).
Eumerus argyropus, Brunetti (*nec* Doleschall), Rec. Ind. Mus. ii, p. 76 (1908).
Eumerus nepalensis, Brunetti, Rec. Ind. Mus. xi, p. 240 (1915); *nec* Brunetti, op. cit. ii, p. 76 (1908).

♀. *Thorax* shining blackish-green, with two whitish, widely separated, longitudinal stripes in middle; pubescence short, shining gold-yellow. Scutellum concolorous with thorax, hind margin deeply outlined, roughly punctate, almost serrate. Abdomen shining black, 2nd segment with two yellow spots occupying nearly all the surface, nearly touching in middle but not reaching side margins; 3rd segment with a whitish-yellow narrow curved band, interrupted in middle; 4th segment with narrow whitish oblique side spots. Venter cinnamon-red. Head shining black; frons rather narrowed behind; neighbourhood of antennæ and a space on upper half of frons with a white spot on each eye-margin. Antennæ pale reddish-yellow, 3rd joint extremely large, round. Eyes pubescent. Legs shining black; tips of front and middle femora, anterior tibiæ and tarsi, basal half of hind tibiæ and hind tarsi except at base, reddish-yellow (but see below, last paragraph); hind femora very incrassate; hind tibiæ rather club-shaped; all tibiæ with glistening white pubescence. Wings rather deeply tinged with brownish-yellow, especially towards tip; last section of 4th vein angularly bent, with a short appendix at outer angle. One ♀: Nicobar Islands.

Length, 7 mm.

Type presumably in Vienna Museum.

The above is a fairly literal translation of Schiner's description*; he notes the species to be near *macrocerus*, Wied., from China, but that the latter has an unstriped thorax and æneous-green legs. He also notes that *splendens*, Wied., is much smaller and differently coloured.

Four ♂ ♂ and two ♀ ♀ (one headless) in the Indian Museum agree very well with Schiner's description. Assuming the identification to be correct, the species differs from *aurifrons*, Wied., by (1) the absolute contiguity of the eyes for some distance in the ♂, (2) the infuscated wing-tip, (3) the undilated hind tarsi in the ♂, not even the metatarsus being thickened at all, and (4) the hind tarsi being wholly yellowish-white except narrowly dark at

* This is Schiner's description only, nothing being added from the specimens presumed by me to be this species, except of course in the succeeding paragraph directly concerning these latter.

the base of the 1st joint. The spots on the 2nd abdominal segment do not nearly fill the surface, but they vary in size and in one specimen come very near to fulfilling Schiner's words. In another specimen the spots on the 3rd segment are as yellow as the first pair, and in another specimen the 4th segment is wholly shining black, without any trace of spots. The degree of infuscation at the wing-tip also varies; in one specimen extending inwards as far as a line from the tip of the 1st vein to the outer side of the discal cell, while in another (♀) only the outer side of the 1st posterior cell is suffused. Mergui; Margherita; Pallade, Travancore, 15. xi. 1908 (*Annandale*). These specimens were incorrectly attributed by me firstly to *argyropus*, Dol.*, and subsequently to my *nepalensis*†, of which the only specimen known to me now is the type. The Sarawak specimen (Sibu, Sarawak, 2. vii. 1910 (*Beebe*)) referred by me to *nepalensis* and redescribed (op. cit., p. 240) is also *nicobarensis* ♀ Length of the specimens examined by me, $5\frac{1}{2}$–$6\frac{1}{2}$ mm. I have subsequently seen further specimens of this species from Pusa, 14. viii. 1907, 8. iii. 1908, and 17 iii. 1908, "under mango bark"; Chapra, Bengal.

194. **Eumerus aurifrons**, *Wied.* (Pl. VI, figs. 2, 3.)

Eumerus aurifrons, Wiedemann, Anal. Ent. p. 32 (1824); de Meijere, Tijd. v. Ent. li, p. 218, ♂ ♀ (1908).
Eumerus splendens, Wiedemann, Auss. Zweifl. ii, p. 114 (1830).

♂ ♀. *Head*: in ♂, eyes slightly but definitely separated, wholly covered with dense bright yellow pubescence; vertical triangle elongate, ground-colour shining black, with yellow tomentum and dense yellow pubescence which extends over vertex also; face æneous-black, with yellowish-grey tomentum and yellow pubescence. Antennæ bright orange, arista black, base orange; 3rd joint very large, rounded but often rather obtuse at tip. Occiput black, varying from æneous to cupreous behind vertex, with side margins of grey tomentum. No black hairs on frons, on vertex or behind vertex in ♂ In ♀, frons barely narrowed at vertex; at level of antennæ forming one-fourth the width of the head; shining blue-black with a large grey dust-spot on each side below middle, which spots generally unite and form a transverse band from eye to eye; a pair of similar dust-spots below vertex, contiguous to eye-margins. Ocellar space with dark brown pubescence; vertical region æneous with greyish pubescence; face with whitish pubescence. Rest as in ♂. *Thorax* and scutellum shining æneous, finely punctate, more or less cupreous-tinged in ♂ Two widely separated narrow grey longitudinal stripes from anterior margin to well behind suture. Whole dorsum, scutellum (hind margin concolorous) and sides with

* Rec. Ind. Mus. ii, p. 76 (1908).
† Op. cit. vi, pp. 239, 240 (1915).

rather long bright yellow pubescence. In ♀, pubescence more whitish. *Abdomen* shining blue-black; finely punctate; 2nd segment with two large yellow spots; 3rd and 4th each with a pair of narrow, slightly curved, greyish spots placed diagonally from middle of segment nearly to hind corners, their inner ends well separated, those on 4th segment generally rather smaller and perpendicular. Normally the first pair of spots are yellow, the others grey, but the middle pair are sometimes intermediate in colour. Pubescence yellowish-grey and more or less erect on spots and along sides of abdomen; black and depressed on black parts. Venter mainly yellowish, black at sides and tip. *Legs* mainly black; anterior femora rather broadly, hind femora narrowly, orange. Apical half of anterior tibiæ blackish with orange tips, but the black colour sometimes reduced, especially in ♀, to an irregular, indefinite broad ring beyond middle; hind tibiæ distinctly incrassate after the base, nearly basal half and tips narrowly orange. Tarsi yellowish, hind metatarsi distinctly incrassate, black with orange tips; 2nd, 3rd and 4th joints rather short, very distinctly dilated in ♂ to nearly double the width of the metatarsus, snow-white; 2nd and 3rd joints of about equal length; 5th joint narrow, snow-white. Hind tarsi in ♀ with only the metatarsi incrassate. Pubescence of legs mainly yellow; black on black parts of hind tibiæ and metatarsi, but on inner side of hind tibiæ yellowish-grey, especially in ♀ *Wings* clear, iridescent, no trace of infuscation apically; stigma varying from pale yellowish to yellowish-brown; halteres yellowish to orange.

Length, 5–6½ mm.

Types in Copenhagen Museum and Wiedemann's collection.

Described from several of each sex in the Pusa collection, from Pusa, 8. iii. 1908, found on gum-saturated earth; 17 iii. 1908, under mango bark; vi. 1916; 9. vii. 1907, on stable wall; 14. viii. 1907; 17, 19 and 28. x. 1908; 14. xii. 1915. Also Chapra, Bengal (*Mackenzie*); Bombay, 11. x. 1912; Ceylon; Java. I have seen one ♂ from Los Baños, Philippine Is.

195. Eumerus nepalensis, *Brun.*

Eumerus nepalensis, Brunetti, Rec. Ind. Mus. ii, p. 76 (1908); *nec* id., op. cit. xi, p. 240 (1915).

♀. *Head* shining black; eyes sparsely pubescent on lower part only; antennæ orange, 3rd joint large, rounded, upper margin blackish. *Thorax* dark shining æneous-black, with tawny-grey pubescence on dorsum, and grey pubescence at the sides; scutellum unicolorous, with soft, rather long yellowish-grey hair, posterior border with a flat edge which is serrated above. *Abdomen* shining black, with two oval, oblique pale spots on 2nd segment, their ends touching the posterior border of the segments near the side margin; extreme posterior border of segments very narrowly tawny. On the 3rd segment are two smaller and

narrower spots similarly situated; on the 4th segment, two hardly visible, pale green, similar spots with white hair. Sides and tip of abdomen with white hair. Venter black, pale in centre. *Legs* black, femora fringed with whitish hair below, posterior femora with black hair on upper side; the basal half and tips of the femora, four anterior tarsi, tip of posterior metatarsus, and apical half of next joint, tawny-yellow; under side of whole posterior tarsi with bright golden-yellow pubescence; four anterior tarsi with some white hairs at base. *Wings* clear, iridescent, veins well marked, stigma brown; tegulæ and halteres yellowish.

Length, 8 mm.

Described from the unique *type* in the Indian Museum collection, from Chonebal, Nepal..

Only the type-specimen is known *, and it is now in bad condition. Its principal difference from *aurifrons* is the larger size, 8 mm. as against 5–6½, and the sparse whitish pubescence of the eyes as contrasted with the dense yellow pubescence in *aurifrons*.

196. Eumerus rufoscutellatus, *Brun.*

Eumerus rufoscutellatus, Brunetti, Rec. Ind. Mus. ix, p. 269 (1913).

♂ *Head*: eyes absolutely bare; contiguous for only one-fourth the distance from vertex to antennæ, rather suddenly separated above this space, forming a moderately wide frons which is black, with black hairs in the middle and bright yellow hairs on vertex and lowest part; facets of uniform size throughout except those immediately in front; frons flat, not at all prominent, yellowish-grey with bright yellow hair. Antennæ large, rather dark brown, first two joints normally bristly; 3rd joint a little lighter on upper side, with microscopic grey tomentum, rounded above to tip, straight on lower side; arista long, dorsal. *Thorax* violet-æneous, moderately shining, with moderately dense short brownish-yellow pubescence, and two widely separated grey tomentose longitudinal stripes from anterior margin to scutellum; also with a stripe along the transverse suture, but this is interrupted between the two longitudinal stripes. Humeral calli æneous, with a little yellow pubescence. Sides of thorax blackish-æneous, with a considerable amount of bright yellow hair on pleuræ. Scutellum broad, violet-æneous, covered with copious long bright yellow hair; hind border pale. *Abdomen* dark æneous-black, not very shining, basal corners a little steel-coloured when viewed from certain angles; a pair of diverging, narrow, elongate, grey, tomentose stripes on 2nd, 3rd and 4th segments, beginning approximately near base of each segment and extending nearly to posterior corners. Surface of abdomen with microscopic pale yellow pubescence, which is brighter and longer on hind margins of segments; a patch of bright reddish-

* See note under *E. nicobarensis*, p. 252.

orange pubescence at basal corners of 2nd segment. Tip of abdomen black-haired; venter blackish with a little sparse yellow pubescence. *Legs* black; basal half and tips of anterior tibiæ, and the anterior tarsi, brownish-yellow; hind legs black, except knees, tips of tibiæ and apical part of each tarsal joint. All legs with yellow pubescence, rather long on femora and tibiæ, especially on hinder and under sides; hind tarsi considerably incrassate, with bright reddish-brown pubescence. *Wings* grey, stigma small, blackish; anterior cross-vein at two-thirds of discal cell, very sloping; halteres yellow.

Length, 12 mm.

Described from a ♂ in the Indian Museum, in inferior condition through immersion in spirit, from Singla, Darjiling District. A species conspicuous by its densely yellow-haired scutellum and its large size.

197. Eumerus pulcherrimus, *Brun.*

Eumerus pulcherrimus, Brunetti, Rec. Ind. Mus. xi, p. 243 (1915).

♀. *Head*: frons one-sixth width of head, æneous, darker on vertex, with a slightly greenish tinge in front, minutely punctured. Ocelli small, red, well separated from one another and from eye-margins. At each side of the frons, along the eye-margins, from the lowest ocellus to just above the antennæ, a little yellowish pollinose dusting, which becomes white at level of antennæ, where it merges in the white-dusted face covered with white hair. Frons covered with a moderate amount of light yellowish hair, which on the vertex is replaced by dark brown hair. Posterior orbits of eyes rather narrow, yellow-dusted, with bright yellow hair behind vertex. Eyes with dense short brownish-grey hairs. Antennæ black, with a little hoary bloom, if viewed from in front; 3rd joint rather more squarish than in *rufoscutellatus*; arista black, a little pale at base. Proboscis dark brown. *Thorax* æneous, with brilliant cupreous and violet reflections; a little (but conspicuously) hoary below the anterior margin in front. Three very narrow white dorsal lines from anterior margin, not reaching posterior margin; a transverse narrow whitish line on suture. Sides below shoulders yellowish-white with shaggy yellowish-white hair. Humeral calli small, æneous; remainder of thorax below dorsum, grey. Scutellum very conspicuous, bright shining cupreous with dense long reddish-orange hair and pale hind margin. *Abdomen* æneous-violet; a large triangular cupreous spot, with yellow hairs in front and with whitish hairs behind, on each side of 2nd segment. In certain lights the sides of the abdomen towards the tip, and the whole of the last (4th) segment appear more or less cupreous or æneous. On the middle of each of the 2nd, 3rd and 4th segments are two greyish-white, narrow stripes, beginning in the centre of each segment, almost contiguous, and extending diagonally to the posterior corners. Whole

surface of abdomen uniformly punctured, and covered with short depressed light yellow hairs, which are much thicker on last segment. Venter dull liver-brown. *Legs*: coxæ blackish, with hoary bloom and greyish hairs. Anterior femora dull æneous-black, a little brownish-yellow at base and tips; a fringe of pale yellow hairs on under side; hind femora considerably enlarged, distinctly æneous, covered with yellowish-grey hair; brownish-yellow at base and tips. Anterior tibiæ with basal half brownish-yellow, apical half or thereabouts, blackish; tips brownish-yellow; whole tibiæ with yellowish-grey hair. Hind tibiæ as æneous as hind femora, considerably larger than anterior pairs, and covered with much more hair. Anterior tarsi moderately bright brown with yellowish-grey hairs; hind tarsi blackish above with yellowish-grey hairs, bright reddish-brown below, incrassate to a normal extent. *Wings* very pale grey; stigma small, dark brown; halteres pale yellow.

Length, 7 mm.

Described from a unique ♀, in perfect condition in the Indian Museum, from Kurseong, 8. vii. 1908.

A very handsome species, conspicuous by its cupreous and violet thorax, its densely orange-haired scutellum, the three pale longitudinal stripes on its thorax, the suture of which is outlined with whitish. Near *aurifrons*, Wied., and *albifrons*, Walk., but distinguished by the black antennæ and orange-haired scutellum.

198. **Eumerus æneithorax**, *Brun.*

Eumerus æneithorax, Brunetti, Rec. Ind. Mus. xi, p. 244 (1915).

♂. *Head*: eyes contiguous for a comparatively short space only, with short white pubescence. Frons and vertex æneous, showing various tints when viewed from different directions; black hair on lower part of frons, yellow hairs on upper part and on vertex. Face dull blackish-grey, with light tomentum which appears yellowish-white when viewed from above. Face clothed with white hairs. Antennæ wholly black, 3rd joint approximately oblong, with obtusely rounded tip. Occiput whitish-grey with a narrow fringe of whitish hairs round the margins, some yellow hair on the æneous upper ocular margin, which is moderately puffed out. In ♀, head almost punctate, sides of frons and face parallel almost to mouth; pubescence black, long and dense on vertex, extending less densely to base of antennæ, but replaced towards eye-margins by shorter yellowish depressed hairs. Face with whitish pubescence. *Thorax* and *scutellum* shining æneous, both rather thickly clothed with brownish-yellow pubescence; dorsum with a pair of widely separated whitish-tomentose stripes and traces of a very narrow median line of the same colour. Pleuræ dull æneous with a little greyish hair. Hind margin of scutellum concolorous. *Abdomen* dull æneous-black, 2nd, 3rd and 4th segments each with a pair of whitish lunulate dust-spots of the usual

size and shape, placed diagonally; upper ends approximate to one another above centre of segment; posterior ends of 1st and 3rd pairs reaching side margins near posterior angles of segments; 2nd pair of spots not attaining margin. All the spots bear a little yellowish-white hair, which also occurs at the posterior angles of the segments and about the tip of the abdomen. The dark portions of the surface are covered with almost microscopic black pubescence. Venter dull æneous, with some pale yellowish hairs. *Legs*: femora æneous-black, with rather thick yellowish pubescence on hinder and outer sides, and microscopic pubescence of the same colour on remainder of surface. Tibiæ æneous-black, rather broadly pale reddish-brown at base. Tarsi blackish, emarginations slightly reddish-brown; hind metatarsi blackish on disc, reddish-brown towards sides and on under side. *Wings* grey, stigma blackish, inconspicuous; halteres pale yellowish.

Length, 7 mm.

Described from a single perfect ♂ taken by Capt. Evans, R.E., at Simla in August 1914, and presented by him to the Indian Museum. Further specimens of each sex from Simla, ix. 1898 (*Nurse*).

199. Eumerus albifrons, *Walk.* (Pl. VI, fig. 4.)

Eumerus albifrons, Walker, Ins. Saund., Dipt. i, p. 224 (1852).
Eumerus halictiformis, Brunetti, Rec. Ind. Mus. xi, p. 241 (1915).

♂ ♀. *Head*: in ♂, eyes quite bare, touching for a short distance only, the front facets a little larger than the others. Frons strongly punctate, shining black with greyish dust except for a space bearing the two upper ocelli a little below the vertex, and a space lower on the frons bearing the 3rd ocellus. Blackish hairs on the frons rather thickly placed. Face and the narrow occipital margin wholly dusted with ash-grey, the former with whitish hair. Antennæ rather elongate, blackish, 2nd joint wholly and the 3rd joint more or less, dull reddish-brown on the basal part. In the ♀ the frons is barely narrowed at the vertex, and at the level of the antennæ is equal to one-fourth the width of the head; the lowest ocellus is less far removed from the others than in the ♂; the frons is moderately well covered with yellowish-grey hair. *Thorax* strongly punctate; in ground-colour dusted with bluish-grey, with four large blackish spots filling most of the surface, anterior ones more or less rounded; two median dark stripes, leaving a grey intermediate space; pubescence whitish-grey; pleuræ grey with whitish-grey pubescence; scutellum æneous or cupreous, with thick brownish-yellow hair; hind margin pale. *Abdomen* shining black; on each of the 2nd, 3rd and 4th segments a pair of diagonally placed, grey, lunule-like, barely curved spots, beginning almost contiguous to one another in middle of segment near anterior margin, and extending to posterior corners, which they attain. Whole abdomen finely punctate. Venter dark. *Legs*: anterior

femora and tibiæ black, both brownish-yellow at both base and tip, the former with greyish-white hair behind, and the latter more extensively covered with similar hair. Hind femora considerably incrassate, æneous, covered with grey hair; hind tibiæ æneous, covered with grey hair; knees and base of hind femora brownish-yellow. Anterior tarsi brownish-yellow with whitish reflections when viewed in certain lights; hind tarsi brown, the metatarsi much enlarged, black, with yellowish-grey hair above and rich golden-brown pubescence below. *Wings* nearly clear; stigma pale brownish-yellow; halteres pale brownish-yellow.

Length, 5 mm.

Described from one ♂ and one ♀ (types of *halictiformis*) from Puri, Orissa Coast, 1–5. viii. 1910 (*Annandale*). Also Coimbatore, S. India, 2000 ft., 8. viii. 1912; 18. viii. 1912; 19. ix. 1913; 17. iv. 1913; Kangra Valley, 4500 ft., iv. 1899.

Type (♂) of *albifrons* in British Museum, without data; *types* of *halictiformis* (♂ ♀) in Indian Museum. The ♂ type of *halictiformis* agrees exactly with Walker's type, which is in good condition.

200. **Eumerus halictoides**, *Brun.* (Pl. VI, fig. 5.)

Eumerus halictoides, Brunetti, Rec. Ind. Mus. xi, p. 242 (1915).

♂ ♀. Very near *albifrons*, Walk., but certainly distinct. The differences are as follows:—Eyes with grey pubescence in ♀; the frontal triangle in the ♂ is distinctly yellow, with yellow hairs, in complete contrast to the whitish face. The 3rd antennal joint is nearly oblong, rounded above at the tip, instead of being broadly truncate; the thorax is a little, but obviously, cupreous, with two widely separated whitish dorsal lines; the hind margin of the scutellum is concolorous. The hind metatarsus is not greatly thicker than the rest of the hind tarsus and is longer proportionately than in *halictiformis*, in which the hind metatarsus is twice as broad as the other joints, and apparently flatter; lastly the tibiæ and the tarsi are nearly wholly black except for the reddish-brown under side of the hind tarsi. The species is also slightly larger and more robust.

Length, 5–6 mm.

Described from a type ♂ * from Darjiling, 2. x. 1908 (*Brunetti*), and a type ♀ from Simla, 9. v. 1909 (*Annandale*); both in the Indian Museum.

201. **Eumerus pulverulentus**, sp. nov. (Pl. VI, fig. 6.)

♂ ♀. Whole body black (excepting the æneous-green scutellum), distinctly punctate, very slightly shining. *Head*: eyes in ♂ narrowly separated at their angular point of nearest approach; bare except for a little very sparse pubescence on lower part; front facets much larger than the rest. Vertical triangle very large,

* Of which the head is now missing.

grey-dusted and with greyish pubescence. Ocelli wide apart, the two spaces occupied respectively by the anterior ocellus and the hinder pair being nearly bare and bearing black hairs, the intervening surface covered with greyish dust. Face and lower part of head with snow-white tomentum and soft concolorous pubescence; face separated from frons at nearest approach of eyes by a narrow but very distinct shining black bare band. Antennæ dark brown or blackish; 2nd joint unusually long, two-thirds as long as 3rd, bristly above; 3rd elongate, much longer than in any other Indian species, three times as long as wide, tip obtuse, arista dark. Occiput black, the ground-colour greyish in patches. *Thorax* black but ground-colour in considerable part dusty-grey, so as to leave, when the thorax is viewed from behind, two median stripes, two large spaces before suture and two behind it all blackish but of ill-defined shape. Sides of thorax very slightly shining black, grey-dusted and with a little grey pubescence. Scutellum rather dark æneous-green, generally quite differently coloured from thorax and abdomen, but sometimes less conspicuously so; hind margin distinctly greyish. Dorsum of thorax with short, rather depressed, yellowish-grey pubescence, scutellum with similar but longer pubescence. *Abdomen* black, with a pair of barely curved grey elongate spots of the usual shape on 2nd, 3rd and 4th segments, diagonally placed, their upper ends nearly meeting towards middle of anterior margin, their outer ends reaching hind corners, the second and third pairs united on side margins or along under side. A narrow median stripe begins at about middle of 4th segment and is continued to tip of abdomen; it is more conspicuous in ♀ Pubescence of abdomen following ground-colour. *Legs*: coxæ and anterior femora dark brown, tips of latter and sometimes base also, brownish-orange; hind femora all greenish-black or æneous, or sometimes with upper and inner sides more or less brown, exceedingly broadened vertically, with a row of short teeth on apical half of under side. Tibiæ brownish or orange on basal half, blackish apically; tarsi brown, metatarsi black; pubescence of legs greyish or whitish. *Wings* nearly clear; stigma yellowish-brown; halteres brownish-orange.

Length, 4–5½ mm.

Described from two ♂ ♂ and nine ♀ ♀ from Pusa; all bred, 30. iv. 1908, in stem of *Euphorbia* sp., "C. No. 696," and 5. vi. 1907, in stem of "Sig" (? Fig), "C. No. 535." *Type* ♂ and ♀ sent to the British Museum, cotype ♂ and ♀ ♀ in the Pusa collection. One ♀ from Abu (*Nurse*). This species is strikingly distinct from all others by the very elongate narrow antennæ and by the median stripe on the 4th abdominal segment. The yellow-margined scutellum also separates it from the majority of the Oriental species. All the specimens are in inferior condition, but from amongst them it has not been difficult to diagnose the specific characters.

202. **Eumerus sexvittatus**, *Brun.*

Eumerus sexvittatus, Brunetti, Rec. Ind. Mus. xi, p. 245 (1915).

♀. *Head* black, rather dull; vertex and upper part of frons with short black hairs; ocelli small, dull, dark reddish; lower part of frons with yellowish-grey hair; eyes with sparse white pubescence. Face, seen from below, whitish-grey, with whitish-grey hair. Back of head black, with a little short whitish hair on the eye-orbits. Proboscis black, reddish-brown towards tip. Antennæ black, 3rd joint rather large, ovate, lower part white-dusted. *Thorax* black, rather dull, with very short yellowish-brown hair covering all the dorsum and scutellum, and extending over the sides below the shoulders; no trace of fine longitudinal stripes; sides blackish. Hind margin of scutellum concolorous. *Abdomen* black, dull, 1st segment only with a little æneous tinge; 2nd, 3rd and 4th segments with a pair of diagonally placed whitish elongate spots, each beginning near centre of segment, but well separated from one another, and reaching towards but not attaining hind corners. Abdominal pubescence black on the black parts and yellowish on the spots; also towards upper corners of abdomen and at the sides. *Legs* black, with yellowish-grey or whitish-grey pubescence. Bassl half of anterior tibiæ (and, apparently occasionally, the extreme tips of the femora) reddish-brown, the colour on the hind pair of legs much restricted; middle tarsi reddish-brown, except towards tips. Hind femora greatly incrassated as usual, hind metatarsi considerably incrassate. *Wings* pale grey, stigma brownish; signs of a very slight brownish suffusion across the middle of the wing. Halteres yellow.

Length, 8 mm.

Described from one ♀ from Bhowali, Kumaon District, 5700 ft., October 1909 (*Imms*). In the Indian Museum.

203. **Eumerus perpensus**, *Brun.*

Eumerus perpensa, Brunetti, Rec. Ind. Mus. xiii, p. 88 (1917).

♂ ♀. *Head*: in ♂, eyes with brown pubescence, closely contiguous for a distance greater than height of frontal triangle; vertical triangle black with a slight æneous tinge and yellow pubescence; ocelli small, placed at lower extremity of triangle amid a little black hair. Frons and face with white tomentum, latter with white pubescence also. Occiput rather broad behind upper part of eyes, rather æneous-black, but dying away at middle of eyes laterally. Antennæ moderately dark, paler on inner side, 3rd joint approximately ovate, arista black. Mouth-parts brown. In ♀, frons and face æneous-black, seen to be grey-dusted when viewed at a low angle; frons with rather dense dark brown and yellow hairs; face with white pubescence. *Thorax* æneous blue-black, shining, with two narrow whitish well-separated median stripes ending some distance before the scutellum; latter wholly blue-black; dorsum of thorax with yellow pubescence, that on scutellum, greyish. A little yellowish pubescence on anterior

half of side margins of thorax. Sides of thorax æneous-black, with greyish pubescence, except for a fan-shaped row of bright yellow hairs in front of the wing-base. *Abdomen* shining æneous blue-black with minute greyish pubescence, which is only obvious at the side margins and on the spots. The usual three pairs of sublunate spots placed on the hinder half of the 2nd, 3rd and 4th segments, only the latter pair extending over side margins. The spots are of about equal width, the 3rd pair more indistinct; all are white-haired. Each pair of spots begins at about the middle of the segment, and the spots are well separated at their inner upper ends, 2nd pair terminating a little further from the hind margin of the segment than the 1st, whilst the 3rd pair terminate still further from the hind margin than the 2nd pair. Venter more or less pale brown. Some longer pubescence at sides of 2nd segment. *Legs* mainly æneous-black, shining. Tips of femora rather narrowly, about basal half and inner sides of anterior tibiæ, and base of hind tibiæ, also tips of all tibiæ, brownish-yellow. Tarsi brown with pale pubescence, hind pair with gold-brown pubescence on under side. A double row of six small black spines below hind femora near tip. *Wings* vitreous, iridescent; stigma brown, small, distinct; halteres brownish-yellow.

Length, 7 mm.

Described from a single ♀ in the Indian Museum from Phagu, Simla District, 18–21. v. 1916 (*Annandale & Kemp*). Simla, viii. 1898 (*Nurse*), 1 ♂.

204. Eumerus perplexus, *Brun.*

Eumerus perplexa, Brunetti, Rec. Ind. Mus. xiii, p. 89 (1917).

♀. Allied to *perpensus*, but showing the following differences:— Eyes with weak brownish pubescence. Antennæ blackish; 3rd joint rounded, with greyish bloom, not lighter on inner side. Dorsal pale thoracic stripes apparently less distinct. *Abdomen* deeper blue-black and the white pubescence on the spots and sides of abdomen a little more conspicuous. Middle tibiæ and tarsi wholly orange, latter a little obscure on upper side; hind tarsi more orange than in *perpensus*. *Wings* distinctly grey.

Described from a unique ♀ from Simla, 12–13. v. 1913 (*Annandale*). In the Indian Museum. Barely longer than *perpensus*, but a more stoutly built species, and apparently distinct though the differences are difficult to define.

Genus **TEMNOSTOMA**, *St. Farg. et Serv.*

Temnostoma, St. Fargeau et Serville, Encycl. Méthod. x, p. 518 (1825).

Microrhincus, Lioy, Atti Isti. Veneto, (3) ix, p. 571 (1864).

GENOTYPE, *Milesia bombylans*, Fabr.; by Coquillett's designation (1910).

Head: semicircular, broader than thorax; eyes bare, in ♂ touching for a short space or very approximate, wide apart in ♀; face cut away below antennæ moderately, thence gently curving outwards towards the moderately produced mouth-edge, in profile obtuse, central bump sometimes present; antennæ prominent, rather short, placed on a prominence, 3rd joint round, rather flattened, arista basal, bare. *Thorax* large, robust, fairly arched, generally with yellow markings. *Abdomen* nearly twice as long as thorax, as wide or very slightly wider; curved, with yellow bands. *Legs* rather strong; hind femora elongate, unarmed; hind tibiæ curved. *Wings* at rest folded over abdomen, generally with a brown patch towards wing-tip on anterior margin; marginal cell open; anterior cross-vein distinctly, but not greatly, beyond middle of discal cell, oblique; tip of 1st posterior cell very pointed; anal vein continued practically in a straight line to wing-border.

Life-history. The European *T. vespiforme* has been bred from larvæ found in decaying wood (*teste* Meigen, cited by Lundbeck, Diptera Danica, v, p. 553, 1916). The adults occur on flowers and bushes and are always rare.

Range. Europe, Siberia, Caucasus, India, North America.

205. **Temnostoma nigrimanus**, *Brun.* (emend.).

Temnostoma nigrimana, Brunetti, Rec. Ind. Mus. xi, p. 246, pl. xiii, fig. 15, abdomen (1915).

♂. *Head* wholly bright yellow with concolorous tomentum and a little yellow hair along eye-margins below antennæ; antennal prominence, facial bump and mouth-opening a little more orange; oral orifice, proboscis and a short black stripe reaching from lower corner of each eye half-way to end of snout, black. Antennæ orange, 1st joint and basal half of 2nd black, arista dull orange. Vertex reddish-brown with long black hairs in front and brownish-yellow hair behind; occiput greyish, with a fringe of yellow hairs behind eyes, becoming longer on under side of head and hinder part of cheeks. *Thorax* slightly shining black, a trace of a pair of narrow median grey stripes towards anterior margin; humeri conspicuously bright yellow, anterior margin on inner side of either humerus dull reddish-orange; an elongate brownish-orange spot on the side of the dorsum just above and in front of the wing, reaching to the similarly coloured posterior calli; a rather small oval bright lemon-yellow spot on propleura. Pubescence of disc of dorsum rather thick, black; bright yellow on humeri and on pleura below the lemon-coloured spot; reddish on the marginal spot above the wings and on posterior calli, where there are black hairs intermixed. Scutellum reddish-brown, base black nearly to middle, long yellow hairs on anterior half and brownish-black hairs on posterior half. A large bunch of long reddish-orange hair on mesopleura. *Abdomen* black; 1st segment with bright brown hair at sides; 2nd with a reddish-brown hind border, which is

widest towards the sides, and with a bright chrome-yellow, moderately narrow band in front of the middle; 3rd with a similar orange band in front of the middle and another on the posterior margin; 4th similar to 3rd, but the hinder band much wider; genitalia wholly reddish-brown. Pubescence on dorsum of abdomen mainly bright yellow, becoming brown on the black parts of the surface; mainly black on 4th segment and genitalia. Venter black, with a rather narrow yellowish band on posterior margin of segments. *Legs* principally orange; coxæ, and a broad

Fig. 50.—*Temnostoma nigrimanus*, Brun., abdomen.

stripe on under side of hind femora, black; a black streak on front side of middle femora; apical half of fore tibiæ, and the fore tarsi wholly, black. Pubescence on legs mainly yellow, bright lemon-yellow and short on basal parts of tibiæ. *Wings* yellowish-grey, anterior part brownish-yellow as far inwards as to fill both basal cells; halteres yellow.

Length, 16 mm.

Described from two ♂ ♂ in the Indian Museum from Garhwal District, 11,000 ft., vi. 1914. There is a considerable general resemblance at first sight between this species and my *Milesia ferruginosa*, which is not rare in the Kumaon District.

Genus **MILESIA**, *Latr.*

Milesia, Latreille, Hist. Nat. Crust. Ins. xiv, p. 361 (1804).
Sphixea, Rondani, Nuov. Annal. Sci. Nat. Bolog. (2) ii, p. 455 (1844).
Sphyxæa, Rondani, Dipt. Ital. Prod. i, p. 223 (1856).

GENOTYPE, *Syrphus splendidus*, Rossi, Faun. Etrus. ii, p. 292 (1790) *.

* A little obscurity attaches to the correct application of the name *Milesia*, which is ably discussed by Verrall (Brit. Flies, Syrph. p. 629) in his comparison of this genus with its allies. No definite type seems to have been chosen. Verrall shows that *Sphixea*, Rond., is absolutely synonymous with *Milesia*, and the choice of a type appears to lie between *crabroniformis* and *splendida*, with perhaps *ornata*, Fabr., as a third. The older names suggested by some for the first two species, I decline to recognise.

Head semicircular, broader than thorax; eyes bare, contiguous for a short distance in ♂, wider apart in ♀; face hollowed below antennæ, slightly produced over upper mouth-edge, truncate; proboscis usually rather prominent, palpi extremely small; antennæ moderately long, porrect, placed on a distinct prominence; arista bare. *Thorax* large and robust, oblong, generally with yellow markings; scutellum pellucid. *Abdomen* twice as long and about as wide as thorax; only slightly arched, with yellow markings, generally cross-bands. *Legs* strong; hind femora lengthened, with a tooth-like process towards tip on under side. *Wings*

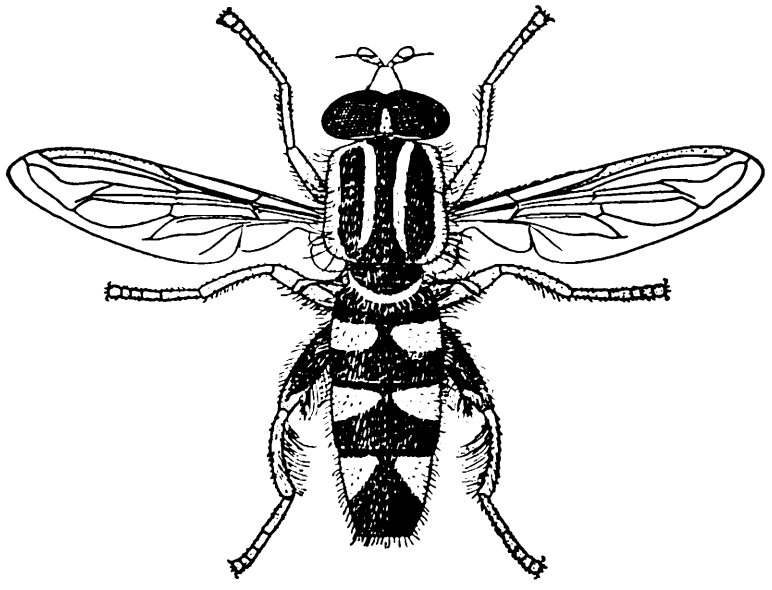

Fig. 51.—*Milesia sexmaculata*, Brun., ♂.

narrow, with the unusual character in this subfamily of possessing a closed marginal cell; anterior cross-vein very oblique, placed far beyond middle of discal cell; 3rd vein with a distinct, though generally shallow, loop into the 1st posterior cell; outer sides of 1st posterior and discal cells almost in a continuous slightly curved line; anal vein almost recurrent.

Life-history apparently unknown.

Range. Europe, Asia, Africa, Orient, North America, Brazil.

The home of this magnificent genus seems to be South Asia and the East Indian Islands. A few notes on some of the Oriental species were given by me in Rec. Ind. Mus. xi, p. 248 (1915).

Table of Species.

1.	Abdomen with distinct pairs of spots; with or without additional transverse bands ...	2.
	Abdomen with transverse pale bands only; never with pairs of spots	4.
2.	Abdomen with three pairs of clear-cut yellow spots; no other abdominal markings	[p. 265. *sexmaculata*, Brun.,
	Abdomen with other yellow markings in addition to three distinct pairs of spots	3.

3. Markings of 2nd and 3rd segments each consisting of a pair of large triangular anterior marks and a pair of smaller triangular marks beyond middle; 4th segment with four subequal spots, the two on each side more or less connected along the lateral margin . .	[p. 266. *macularis*, Wied.,
Markings of 2nd segment consisting of a very large pair of oblong-yellow spots nearly meeting in median line, and a broad yellow band near hind margin, so that the segment is nearly all yellow; 3rd and 4th segments rather similar, but front spots much narrower, transversely placed on front margin; the hind pale band very broad, produced forwards triangularly in middle.	[p. 268. *variegata*, Brun.,
4. Vertex conspicuously swollen.	*verticalis*, sp. n.,
Vertex normal, *i. e.* nearly or quite flush with eyes	[p. 269. 5.
5. Band on anterior margin of 2nd abdominal segment very wide, reaching to middle or beyond . . .	*balteata*, Kert., p. 272.
This band very narrow, never filling even a quarter of the segment*	6.
6. Wings rather clearly divided at the spurious vein into a brown anterior half and a nearly clear hinder half	[p. 273. *ferruginosa*, Brun.,
Wings yellowish-grey, gradually paling hindwards	7.
7. Femora normally orange or orange-brown	*gigas*, Macq., p. 271.
Hind femora black nearly to tip .	*decora*, sp. n., p. 274.

M. semifulva, de Meijere, is not included in the table, as I think that *gigas*, Macq., is a very variable species; it varies in both body and legs from orange-brown to black, and in this case it would absorb the form *semifulva*.

206. **Milesia sexmaculata**, *Brun.*

Milesia sexmaculata, Brunetti, Rec. Ind. Mus. xi, p. 248 (1915).

♂. *Head*: eyes touching for a distance equal to one-third of the height of the frons, which is yellowish, in the form of an elongate isosceles triangle with yellowish hair; the ocelli red, inconspicuous. Eye-facets in front for a short space just perceptibly larger than the others. Face moderately projecting, with brownish-yellow tomentose dusting, becoming paler yellowish about the mouth, the latter black; cheeks black. Occiput dark grey with pale yellowish-grey margin, with a row of short grey hairs behind the eyes. Proboscis black, shining, projecting, two-thirds as long as the height of the head. Antennæ dull

* If, as I suspect, de Meijere's *semifulva* is synonymous with *gigas*, Macq., then the pale band must be defined as reaching to nearly one-third the length of the segment from the front margin.

ferruginous-brown with concolorous style. *Thorax*: dorsum dull black; shoulders, and a lateral stripe extending above the wings from shoulders to scutellum, yellowish-brown; two dorsal median, rather thin, yellowish-grey stripes, a little dilated on anterior margin, and reaching nearly to posterior margin, on which latter is an indistinct yellow-tomentose streak. Scutellum shining black, with a distinct yellowish-brown posterior margin; metanotum shining black. Surface of thorax and scutellum covered with yellow hair. Sides of thorax blackish, apparently with a yellowish spot on the mesopleuræ; stigmatic spots yellow. *Abdomen* black, shining, 1st segment wholly black; 2nd with a yellow transverse sublunate spot on each side near the base, and contiguous to side margin; the two spots fairly widely separated from one another. On 3rd segment a nearly similar pair of yellow spots which are more elongate-conical in shape and similarly situated; on 4th segment a pair of yellow, nearly triangular, spots similarly situated; all six spots of about same size and colour. Abdomen with close black pubescence, except that over the spots, which is yellow. Venter black, yellowish at base of 2nd, 3rd and 4th segments, the yellow colour forming two spots on 2nd segment. *Legs* bright brownish-yellow; anterior femora with a black streak above and below on basal half; hind femora considerably enlarged, with a conspicuous reddish tooth-like prolongation on under side towards the tip; black, except at tips, the reddish-brown colour more extensive on under side. All legs with short yellow pubescence, but hinder side of middle and hind tibiæ with a very thick long fringe of bright yellow hair; (hind tarsi missing). *Wings* yellowish-grey, subcostal cell brownish-yellow; halteres very small, yellow.

Length, 23 mm.

Described from a single ♂ from Trivandrum, Travancore State: in the Indian Museum, received from the Trivandrum Museum.

207 Milesia ? macularis, *Wied.*

Milesia macularis, Wiedemann, Anal. Ent. p. 34 (1824); id., Auss. Zweifl. ii, p. 107 (1830); Macquart, Dipt. Exot. ii, 2, p. 82 (1842).

♀ *Head* yellow, closely covered with bright yellow tomentum and minute concolorous pubescence; frons at level of antennæ about $\frac{1}{3}$ width of head, narrowing at vertex to between $\frac{1}{4}$ and $\frac{1}{3}$ of this width; vertical triangle brownish, a narrow brown stripe thence, gradually widening, to tip of antennal prominence and continued below antennæ to mouth-border; a short brown stripe from near lower corner of eye to mouth-border. Antennæ brownish-orange, tip of 3rd joint a little darker, arista orange. Occiput yellowish; margin with a little yellow pubescence. Proboscis and other mouth-parts orange-brown. *Thorax*: dorsum reddish-brown,

punctulate; humeri yellow, rather prominent; two yellow-tomentose, rather narrow, well-separated stripes, slightly broader anteriorly, from front to hind margin of thorax, with (extending from behind suture to hind margin) a black stripe on inner side of each yellow stripe; the space between these black stripes brightly yellow-tomentose; suture yellow-tomentose from side margin up to the longitudinal yellow stripe; hind corners of dorsum yellow-tomentose. Pleuræ all bright yellow; scutellum orange-brown, with hind margin distinctly yellow, narrowly blackish just inside the yellow margin. Pubescence of thorax very inconspicuous, apparently following ground-colour. *Abdomen* blackish with yellow marks, punctulate; 1st segment black, anterior corners distinctly, and anterior margin narrowly, pale. 2nd segment best described as yellow with a moderately broad median black stripe, and with a black stripe from middle of fore

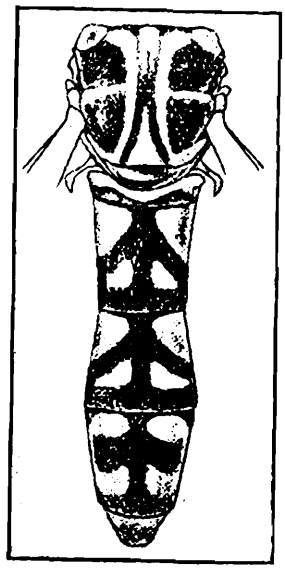

Fig. 52.—*Milesia ? macularis*, Wied., var., abdomen.

border to each hind corner, also with hind margin black; thus leaving a large yellow triangle on each anterior corner of segment and a pair of smaller triangles on middle part of hinder half of segment. 3rd segment exactly as 2nd. 4th segment yellow with a moderately broad median stripe, a very broad transverse band across middle, not reaching sides, and a broadly brown-orange hind margin; thus leaving four elongate yellow spots placed transversely, the two on each side distinctly joined on the margin of the segment. 5th segment wholly brownish-yellow. Venter brownish-yellow; hind margins of 2nd and 3rd segments brown. Pubescence of abdomen very short and inconspicuous, following ground-colour. *Legs*: anterior pairs yellow; anterior tarsi black on upper side except at base, but with a yellowish sheen in certain lights. Hind legs yellow; hind femora with a dark brown streak on upper side, an indistinct brown ring in

middle, and tips more or less brownish; hind tibiæ with an indistinct brown ring in middle; hind tarsi as front pair. Pubescence of legs very short and inconspicuous, yellow except on tarsi, where it is black. *Wings* pale grey; anterior half yellowish-brown, a little darker over the insignificant stigma and thence nearly to tip of 2nd basal cell; also a little darker over base of 1st posterior cell. Halteres yellow.

Length, 15 mm.

Described from a single ♀ in the Indian Museum from Singla, Darjiling District, 1500 ft., iv. 1913 (*Lord Carmichael's collector*).

This specimen was referred by me (Rec. Ind. Mus. ix, p. 268) to *macularis* with some doubt, the discrepancies being the presence of the smaller yellow spots on the 2nd to 4th segments, and a different coloration of antennæ and legs. I have now ventured to assume its identity with Wiedemann's species, which is recorded from Singapore, Java, Sumatra and Borneo. A ♀ in the British Museum from the Ataran Valley, Tenasserim, iv. 1892 (*Bingham*), agrees closely with the Singla example.

208. **Milesia variegata**, *Brun.*

Milesia variegata, Brunetti, Rec. Ind. Mus. ii, p. 80, fig., thorax and abdomen, ♂ (1908); de Meijere, Tijd. v. Ent. li, p. 229 (1908).

♂ ♀. *Head*: vertex narrow, black, with black hairs; a small yellow triangle just above the juncture of the eyes, which are contiguous for only a short space; frons and face bright lemon-yellow, with a broad shining black stripe on each cheek; frontal prominence blackish-brown. Antennæ red-brown, 1st and 2nd joints with one or two strong bristles above and below towards the tips. Proboscis blackish-brown. Back of head grey, posterior orbit of eyes with yellow hair, longest below. In ♀, frons and face gradually widening, former at vertex less than one-fifth width of head; both from pale to deep yellow, with a broad black stripe from vertex to base of antennæ. *Thorax* mainly blackish. Humeral calli with a small oblong spot below each; præ-alar calli, meso-, ptero-, sterno- and metapleuræ, also posterior border of thoracic dorsum, bright lemon-yellow. Two yellowish-grey stripes, narrowed behind, extend from the anterior margin to the centre of the dorsum, where they meet two similar ones extending inwards from either præ-alar callus. Scutellum black at base, the posterior half yellow, with yellow hair; the whole thorax and scutellum covered with short, soft yellowish-grey hair. *Abdomen*: 1st segment shining black, yellowish towards each side in front. 2nd segment lemon-yellow with a very narrow black posterior border; a dorsal, clean-cut, rather narrow, black stripe extends more than half the distance from the base, when it meets a transverse narrow line, almost parallel with the posterior border, but curved forward towards the sides. 3rd and 4th segments pinkish-

brown, with very narrow, black posterior borders, and a short dorsal stripe, which immediately divides, and extends to each side in the shape of a loop, attaining the edge just before the middle of the segment; posterior half of 3rd segment blackish, the colour extended forward in middle; 4th segment narrowly black at base. Genitalia not conspicuous, yellowish-brown. Whole abdomen covered with short yellow hair on the yellow parts, and short black hair on remainder, with rather long yellow hair at sides, and with a row of moderately long black hairs on posterior border of 4th segment. Venter yellow on basal half, with a blackish, narrow, central line; blackish on posterior half, entirely covered with light yellow soft fluffy hair. *Legs*: fore coxæ shining black with soft yellow hair; posterior coxæ apparently yellow, with a black streak below, all covered with close long yellow hair. Femora orange-yellow, with a long black streak on under side; hind pair with a diffused black streak above also, and bearing a moderately long orange-yellow spine below, near the tip. All femora with long yellow hair, with some short rows of black hair intermixed; the hair being scarcest on upper side of anterior femora, and thickest on lower and inner sides of hind pair. Tibiæ tawny-brown, the fore pair darker towards the tip, the middle pair much lighter, the hind pair darker; all the tibiæ with minute yellow pubescence, and with long yellow hair on the under side, consisting of a single shorter fringe on the fore pair, a long and a short fringe on the middle pair, while the hind pair are densely covered on the whole of the lower and inner sides. Tarsi yellowish-tawny, with short yellow pubescence; upper sides blackish-brown. *Wings* pale grey, brownish along anterior margin, and having the slightest possible trace of a dark suffusion towards tip. Halteres, stems yellow, knobs red-brown.

Length, 20 mm.

The description is mainly from a perfect ♂ in the Indian Museum from Sikkim. A second specimen from the Darjiling District, 1000–3000 ft. (*Lord Carmichael's collector*); and de Meijere has seen the species from Sikkim, a single ♂ in the Hungarian National Museum. A series of both sexes in the British Museum from the Runjit Valley, Sikkim, v. 1894 (*Bingham*); Khasi Hills, Assam (*Sladen*); Assam (*Badgley*) and the Domdami Valley, Tenasserim, 27 viii. 1893 (*Bingham*).

209. **Milesia verticalis**, sp. nov.

♂ ♀ *Head*: ♂, orange-yellow; eyes contiguous only at a point, facets almost of uniform size; vertex and vertical triangle very conspicuously swollen, deeper orange; occipital margin behind eyes rather broad in profile, all these parts with dense orange-yellow pubescence. Ocelli very small, close together, placed just below middle of vertical prominence. Frons, face and cheeks with yellow tomentum and a little yellow pubescence

here and there; a narrow black line from lower corner of eye to mouth-tip. A reddish irregular spot above base of antennæ; latter brownish-orange, normal, with orange arista. Mouth-opening, proboscis and palpi black. In ♀, frons with parallel sides for upper half from vertex, thence gradually widening; at greatest width over one-third width of head, the face gradually narrowing; in all else as in ♂ *Thorax*: anterior margin of dorsum rather broadly, humeri and area immediately below them, orange-yellow with dense short concolorous pubescence. Rest of thorax and scutellum rather dull black with sparse short yellow pubescence. Some stiff black hairs along sides of dorsum in region of wing-base; pleuræ with sparse black hairs here and there. Scutellum concolorous, with similar pubescence, anterior margin narrowly and very conspicuously yellow. *Abdomen* rather dull black; 2nd segment with a narrow brownish-orange band behind base, narrowly interrupted in middle and not reaching side margins; a similar, barely perceptible, band on 3rd segment; 4th segment with about apical third brownish-orange. Pubescence of abdomen short and dense, though inconspicuous; blackish-brown, but that on hind margins of 2nd and 3rd segments and apical third of 4th segment is rather longer and more depressed and shining bronze-brown, appearing almost like an additional transverse band on each of these segments. Genitalia concealed, rather large, globular, brownish-orange with concolorous pubescence. Venter black, pubescent, indistinctly paler at emarginations of segments and at tip. *Legs* practically black, but front femora dark brown except for a black elongate spot on lower side at base; posterior femora on apical half, middle femora on inner side also, and posterior tibiæ, all more or less tinged with dark mahogany-brown. Pubescence of legs black, moderately dense on femora but longer behind; middle tibiæ with dense long pubescence on inner and hinder sides, and hind tibiæ with similar pubescence on inner side only. Anterior pulvilli brownish-orange; all tarsi with very short brownish-orange pubescence. *Wings* yellowish-grey; anterior half dark brown, fading a little distally; the colour very sharply delimited hindwards at the *vena spuria*, the space between this vein and the 5th vein absolutely and conspicuously hyaline as far as the anterior cross-vein. 5th vein slightly clouded with yellowish-brown; halteres brown.

Length, 20–26 mm.; expanse of wings 42 mm.

Described from 7 ♂ ♂ and a unique ♀ from above Tura, Garo Hills, Assam, 3500–3900 ft., 15. vii–30. viii. 1917 (*Kemp*). In the Indian Museum.

This very handsome hornet-like species closely resembles *M. gigas*, Macq., but the thick bright orange-yellow band behind the eyes and the conspicuously elevated vertex at once distinguish it, whilst the hyaline space in the 2nd basal cell is also very characteristic. There are several other differences which, however, are not so striking.

210. Milesia gigas, *Macq.*

Milesia gigas, Macquart, Hist. Nat. Ins., Dipt. i, p. 533 (1834); id., Dipt. Exot. ii, 2, p. 80, pl. xv, fig. 3 (1842).
Milesia semifulva, de Meijere, Bijd. tot Dierk. xvii, p. 99, pl. viii, fig. 16 (1904).

♂ ♀ Very near *M. verticalis*, but variable in size. *Head*: vertex only just perceptibly above level of eyes; back of head not projecting behind eyes in profile; whole head more yellowish than orange, and the tomentum pale yellow; only the faintest trace of a stripe on cheeks. *Thorax* varying from orange-brown, with three more or less indefinite or incomplete, moderately wide, black stripes not quite reaching either front or hind margin, to an almost entirely blackish dorsum with dull orange-brown anterior corners, indistinct narrow sutural band and hind margin. Pleuræ and scutellum varying from wholly orange-brown (with or without a blackish spot on mesopleuræ) to wholly blackish. Pubescence of thorax pale to brownish-yellow. *Abdomen* varying from orange-brown to blackish; in latter case 4th segment wholly black or with hinder half reddish-orange. A narrow, pale yellowish, slightly arcuate band on anterior margin of 2nd segment; 3rd segment with a still narrower yellow band on extreme anterior margin, almost imperceptible in centre. Venter with bases of segments broadly yellowish. Pubescence of abdomen mainly very short, pale yellow, but darker towards sides in dark specimens. *Legs*: fore pair orange-brown, a broad black streak below on basal half of femora and one on hinder side of tibiæ; middle legs wholly orange-brown, with long brownish-yellow pubescence below femora and very long, bright yellow, coarse pubescence on hinder side of tibiæ; hind femora from orange to blackish-brown, in the latter case sometimes more or less orange-brown at base and tips; hind tibiæ similar; hind tarsi from golden-brown to dark brown above, paler below. There is a distinct, moderate-sized tooth on the under side of the hind femora near the tip. Pubescence of hind legs bright yellow to blackish-brown, generally following ground-colour of body; very long and dense on under and hinder sides of femora, and on inner and front sides of tibiæ. *Wings* pale yellowish-grey; anterior half down to about the spurious vein a little more brownish. In all else as in *verticalis*.

Length, 20–27 mm.

Described from three ♂ ♂ and one ♀ in the Indian Museum in indifferent condition; two of them from the Darjiling District, 1000–3000 ft., v. 1912. In one ♂ the band on the 2nd abdominal segment is more whitish and nearly translucent and wider towards the sides, whilst the sides anteriorly of the 3rd segment and nearly all the 4th segment have a rich brown tinge. Also described partly from other specimens in the British Museum. Khasi Hills, Assam (*Sladen*): Moolau, Burma, ii. 1892 (*Bingham*); Bukit Kutu, Selangor (*Robinson*). Described originally from Java, and also recorded from Sumatra.

I believe this species varies from entirely orange-brown to practically all-blackish with the margins of the thorax and tip of the abdomen orange-brown, the latter condition being exemplified in the Selangor specimen.

211. **Milesia balteata**, *Kert.*

Milesia balteata, Kertész, Termés. Füzet. xxiv, p. 414 (1901).
Milesia himalayensis, Brunetti, Rec. Ind. Mus. ii, p. 82, ♂ ♀ (1908).

♂ ♀. *Head*: ♂, vertex shining black, a very small grey-headed triangle just above junction of eyes; frons and face blackish-grey, shining, with silvery reflections when seen from above; frontal prominence dark brown; antennæ dull orange to dark brown. Back of head grey, posterior orbit of eyes with a little short greyish hair. ♀, frons yellowish-grey; a broad shining bare black stripe (occupying nearly whole width of frontal space) extending from vertex to frontal prominence; lower part of face and cheeks shining black, nearly bare, without whitish reflections, but with traces of a greyish stripe on cheeks. *Thorax*: ground-colour blackish, covered with close ferruginous-brown hair (♂); or greenish-yellow tomentose, with greenish-yellow hair (♀). Humeral calli concolorous in ♂, yellow, with yellowish hair in ♀, with a small, oval, yellow spot below each of them. Sides of thorax dark grey, with a considerable amount of brownish, rough hair in ♂; in ♀ barer, with a little sparse grey hair, and a stripe below wing-sections extending to the scutellum; the latter is light brown in ♂ and yellow in ♀, in both sexes with yellow hair. *Abdomen* in ♂ dark brown; in ♀ shining metallic-blue; in both sexes with a broad bright lemon-yellow band at the base of the 2nd segment, occupying more than half of it; a very narrow yellow band near the base of the 3rd segment in ♀. Dorsum covered in ♂ with yellow hair mixed with black, but wholly yellow on the cross-band; hair on sides of abdomen brown, except towards base, where it is longest, yellow and silky. In ♀, dorsum clothed with yellow hair on cross-band, and minute black hair elsewhere, except at sides towards base, where it is thick and yellow, but shorter than in ♂ *Legs* black, shining, with some blackish-brown hairs on hind pair, and a not very strong black tooth on under side of hind femur near tip (♂ ♀). Femora black, tips tawny; some black short bristly hairs, mixed with yellow hairs, on lower side of fore pair; middle pair with long brownish-yellow hair above and below (much longer in ♂); hind pair in ♂ covered with long yellow hair on upper side, and longer brown hair on under side; in ♀, some short yellow silky hair on upper side, and brown hair below, which is neither as long or as thick as in ♂. The fore tibiæ (♂ ♀) are tawny, with a long black streak in front, extending from tip nearly to base; in ♂ there are minute black hairs in front, and longer black silky hairs behind; in ♀ they are nearly bare, only a few short, black hairs

being present. Middle tibiæ bright lemon-yellow (♂ ♀), with soft pale yellow hair, which is very long behind, in the ♂; whereas in the ♀ they are almost bare, except for some moderately long pale yellow hairs behind. Hind tibiæ blackish-brown (darker in ♂); tips narrowly brown (♂), or this colour spread more or less over upper side towards tip (♀); in ♂ the hind tibiæ have a fringe of long and very thick dark brown hairs on the front, outer and hinder sides, longest on the latter, whilst in the ♀ they have only very short black hairs, which attain to a short row of bristly hairs on upper side, and some moderately long silky brownish-black hairs on lower side. Tarsi blackish-brown, with short black hairs; basal joint of middle pair pale yellow in ♀ above and below; under side of hind pair with gold-brown short pubescence. *Wings* pale grey, a little darker yellowish-brown from the anterior margin to about the 3rd longitudinal vein. Halteres tawny. Squamæ pale yellow, with long yellow hair.

Length, 13–22 mm.

Described from a ♂ from Assam (Sibsagar) and a ♀ from Sikkim, both in the Indian Museum collection in excellent condition. A further series from Darjiling District confirms the characters of the species. Darjiling, 7000 ft., 31. iii. 1894 (*Bingham*); Sibsagar, Assam (*S. E. Paul*); Khasi Hills, Assam (*Sladen*; *Godwin-Austen*) and Lower Ranges, 1878 (*Chennell*); Runjit Valley, Sikkim, v. 1894 (*Bingham*); S. Shan States, 4000 ft., xi. 1899 (*Bingham*); Domdami Valley, Tenasserim, 27. viii. 1893 (*Bingham*). The identity of my *himalayensis* with *balteata*, Kertész, was pointed out by de Meijere (Tijd. v. Ent. li, p. 229, 1908).

212. Milesia ferruginosa, *Brun.*

Milesia ferruginosa, Brunetti, Rec. Ind. Mus. ix, p. 268, pl. xiv, fig. 12 (1913).

♂ ♀ *Head* rich shining yellowish or yellowish-brown. In ♂, eyes very closely approximate, but not absolutely contiguous, for a distance of about 10 facets. Vertical triangle elongate, orange-brown, raised above level of eyes, with black pubescence; frons and face bright chrome- to orange-yellow; antennæ and arista orange. Proboscis, palpi and labella blackish. Occiput dusted with bright yellow. In ♀, with a large, approximately oval, bright yellow-dusted spot on each side of middle of frons contiguous to eyes; traces of yellow dust on cheeks and above mouth-opening, where are also a few short yellowish hairs. Frons just above antennæ one-third the width of the head, diminishing to half that width at vertex, with a few scattered black hairs. *Thorax* brownish-yellow; dorsum mainly filled by three nearly or quite contiguous black stripes of equal width, not attaining anterior margin, but the two outer stripes reaching posterior margin; the spaces between the stripes on anterior part occupied by two narrow dust-lines, broadest in front, and extending

posteriorly to just beyond the suture. Humeral calli distinct, a little brighter yellow. Whole dorsum with minute black or yellow pubescence, following the ground-colour. Scutellum deep reddish, broadly black at base, whole surface with moderately long black softer pubescence and numerous isolated longer hairs; posterior border with a sparse fringe of very short golden-yellow hairs. Sides of thorax black; mesopleura wholly, and the adjacent margins of the pteropleura and sternopleura broadly, with a space below the shoulders, brownish-yellow. *Abdomen*: 1st segment entirely black; 2nd black, with a very narrow but well-defined lemon-yellow band a little beyond the base, apex of segment with short yellow hairs; 3rd and 4th segments with a moderately broad chrome-yellow band at base, followed by a narrow, not well defined, though distinct, black band, more or less emarginate in the middle, the remainder of each segment rather bright reddish-yellow. The whole dorsum of the abdomen has short recumbent yellow hairs, which are nearly whitish on the 1st segment and become more reddish-yellow on the 3rd and 4th segments. Genitalia withdrawn, apparently fairly large, reddish-yellow with black hairs. Venter black, yellow-haired, posterior margins of segments narrowly yellow. *Legs*: femora reddish-yellow or orange; basal half of posterior pairs black, inner sides of anterior femora with black stiff pubescence, hinder sides with longer and softer hairs, especially on apical half. Hind femora with a small yellowish tooth just beyond two-thirds of their length; pubescence covering most of the femur yellowish, but some longer black hairs on under side. Tibiæ yellow, posterior pairs paler, all with short and rather close pale yellow pubescence. Tarsi pale yellow with concolorous pubescence, fore pair with traces of blackish here and there. *Wings* pale grey; yellowish-brown from costa to spurious vein, the colour extending just behind the apical half of the 3rd longitudinal vein. Halteres small, black.

Length, 10–17 mm.

Described originally from three ♀ ♀ from Darjiling District, 1000–3000 ft. (*Lord Carmichael's collector*), and from Singla, 1500 ft., iv. 1913 (*type*); also from three ♀ ♀ sent me for identification by Dr. Imms, taken by him in the Kumaon District, 13. v, 18. v, and 18. v. 1912. Peshoke Spur, Darjiling District (*R. S. Lister*); Kousanie, Kumaon District, 6075 ft. (*Col. Tytler*); Runjit Valley, Sikkim, v. 1894 (*Bingham*); Kolaw, S. Shan States, 4000 ft., iv. 1916 (*Mackwood*); Khasi Hills, Assam (*Sladen*). The species seems remarkably constant in its markings and coloration, but varies considerably in size. It seems to come near *M. doriæ*, Rond., described from Borneo. *Types* in Indian Museum.

213. **Milesia decora**, sp. nov.

♀. Considerably like *M. ferruginosa*, Brun. *Head* orange-brown, middle third of frons dusted with bright yellow; frons

gradually widening, at vertex from $\frac{1}{5}$ to $\frac{1}{6}$ width of head, at level of antennæ about $\frac{1}{3}$; bearing some black hairs. Antennæ concolorous; proboscis blackish. Occiput not extending below eyes, yellow-dusted, with a very short yellow fringe on lower part. *Thorax* orange-brown, blackish for a small space in middle of hind margin; and traces which indicate three darker stripes may sometimes be present. Scutellum blackish. Whole thorax with a little short pale hair, which is longer on scutellum. *Abdomen* with 1st and 2nd segments black, the latter with a narrow pale yellow band on anterior margin; 3rd and 4th orange-brown, 3rd with a moderately narrow band in front of hind margin, and with a median dorsal stripe joining this band to the anterior margin; 4th with a blackish spot in middle and a similar dorsal stripe; all the black markings with rather indefinite edges. Pubescence short, pale yellow, longer and more whitish at sides of 1st and 2nd segments. Venter yellowish, with a little long fine pubescence. *Legs* orange-brown, with short, pale yellow pubescence; hind coxæ and greater part of hind femora from base blackish; a small tooth on lower side of latter near tip. *Wings* yellowish, darker anteriorly nearly to middle; halteres brown.

Length, 16 mm.

Described from a unique ♀ in the British Museum. Lower Ranges, N. Khasi Hills, Assam, 1878 (*Chennell*).

Genus **BRACHYPALPUS**, *Macq.*

Brachypalpus, Macquart, Hist. Nat. Ins., Dipt. i, p. 523 (1830).

GENOTYPE, *Syrphus valgus*, Panz., as *tuberculatus*, Macq., by designation of Rondani, Nuovi Ann. Sci. Nat. Bologna, (2) ii, p. 456 (1844).

Head broader than thorax: eyes bare, contiguous for a considerable space in the ♂, widely separated in ♀; face hollowed below antennæ and produced at upper mouth-edge, no central knob; antennæ prominent though not long, placed on a small prominence, 3rd joint rounded, arista sub-basal, bare. *Thorax* blackish or dark æneous, almost oblong, considerably pubescent; no bristly hairs. *Abdomen* with rare exceptions elongate, narrower than thorax, with sides almost parallel. *Legs* strong; hind femora considerably thickened, very pubescent, with spiny bristles on under side; hind tibiæ rather bent; hind trochanters of ♂ with a small process on under side. *Wings* much as in *Criorrhina*.

Life-history. The early stages are probably passed in rotting portions of living trees. *B. valgus* has been found in decaying willows in Europe (Bremi, Isis, 1846, p. 174; cited by Lundbeck, Dipt. Danica, v, p. 505, 1916).

Range. Europe, India, North America.

A very restricted genus, the only Oriental species being *B. dives*.

214. **Brachypalpus dives**, *Brun.*

Brachypalpus dives, Brunetti, Rec. Ind. Mus. ii, p. 86 (1908).

♂ Whole face yellow with silvery-yellow tomentum; antennæ yellow, 3rd joint darker; eyes contiguous for half the distance to vertex; proboscis brown, posterior orbit of head entirely encircled by a fringe of bright yellow hair. *Thorax* with ground-colour æneous with a slight violet tinge on dorsum, covered with rather thick short yellow hair; no signs of stripes or bands; sides of thorax cinereous, with a thick elongated bunch of yellow hair just in front of and below insertion of each wing; scutellum æneous, thickly covered with yellow hair; the extreme edge is narrowly ridged all round and is yellow. *Abdomen* elongated, much narrower than thorax and only slightly narrowing towards apex, brilliantly shining golden-yellow; 1st segment dull æneous-green; the whole abdomen thickly covered with golden-yellow hair which is longest at sides and tip. Venter yellow, nearly bare. *Legs* bright yellow, fore pair normal, femora with rather thick yellow hair; the middle femora are distinctly, though not greatly, enlarged towards tip, with a fringe of long golden-yellow hair in front and behind, and a shorter fringe above; the middle tibiæ have above and below, excessively long and thick golden-yellow hair; hind femora slightly and uniformly thicker, very slightly pale brownish with a blackish streak on upper side, covered with moderately long golden-yellow hair—the tooth on the under side is near the tip and is followed by a semicircular protuberance marked with black; hind tibiæ well curved, yellowish-brown, darker on inner side, slightly narrow at base, near which is a distinct tooth; black hairs on inner side and a narrow row of pale yellow hair on outer side. Anterior tarsi yellow, with some small black spines at tip of each joint, hind tarsi similar, but brownish, with golden-brown thick short pubescence on under side and long black hair, bushy and straggly, on outer side. *Wings* pale yellowish; anterior border, to 1st longitudinal vein, a little deeper yellow. Halteres yellowish-brown; squamæ yellow, both pairs with a fringe of thick yellow hair.

Length, 17 mm.

Described from one ♂ (*type*) in perfect condition in the Indian Museum collection, from Kohima, Assam. There is a second ♂ in the British Museum from the Khasi Hills, Assam. A magnificent species.

Genus **LYCASTRIS**, *Walk.*

Lycastris, Walker, Trans. Ent. Soc. Lond. (n. s.) iv, p. 155 (1857).
Xiphopheromyia, Bigot, Wien. Ent. Zeit. xi, p. 161 (1892).

GENOTYPE, *L. albipes*, Walker, sp. nov.

Head rather flattened in front, slightly wider than thorax. Eyes bare, contiguous in ♂ for a very short distance only, well

separated on vertex; facets all equal. In ♀, a moderately wide, nearly linear frons, flush with eyes for a considerable distance. Frons in both sexes after a certain distance projecting abruptly forward into a strong prominence bearing the antennæ at the tip. Below the antennæ, the face is slightly cut away. Lower part of head extremely produced into a nearly porrect bare conical rostrum, not produced below eyes at sides, much longer than in *Rhingia*, and up to nearly three times as long as width of eye in profile. Proboscis about twice as long as rostrum, very slender, cylindrical, capable by means of its membranous basal part of being prolonged to a greater length than that of the whole body. Antennæ normal, 3rd joint rounded or ovate. *Thorax* subquadrate; scutellum normal, semicircular; both densely pubescent. *Abdomen* approximately ovate, arched, tip narrowed, pubescent. Genital organs curved under tip of abdomen. *Legs* rather long and strong, simple, moderately pubescent. *Wings* with a distinguishing venation. Subcostal cell with a peculiar row of about seven or

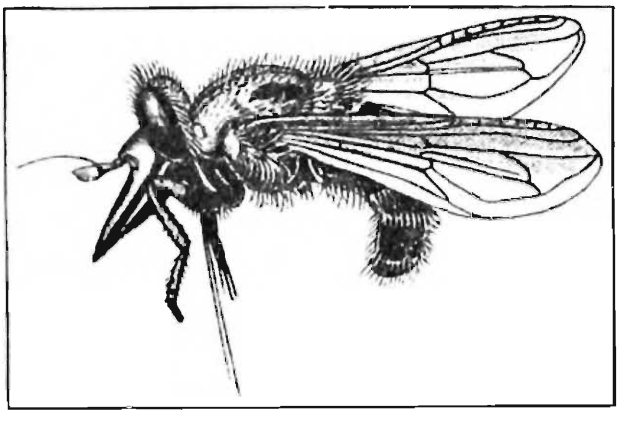

Fig. 53.—*Lycastris albipes*, Walk.

eight small transverse veinlets, the first at the tip of the auxiliary vein. 3rd vein nearly straight; 4th vein bent downwards just before its upward turn, apical section wavy, closing 1st posterior cell in a fine point almost exactly on wing-border. Anterior cross-vein extremely oblique and very curved, placed towards tip of discal cell (more distal than in any other Oriental genus known to me). 5th vein bent upwards in a broad curve, instead of angled as in most genera; anal vein continued forward for a considerable distance before reaching the margin.

Range. India and Formosa.

Life-history unknown.

This genus is one of the most conspicuous in the family. Its extremely produced conical rostrum and still longer proboscis, its abnormal venation (due to the numerous additional veinlets in the subcostal cell), and the very distal position of the anterior cross-vein, with the peculiarly curved 4th vein and prolongation

of the anal vein, all constitute marked features. It seems most nearly related to *Criorrhina* and *Brachypalpus*.

The two Indian species are easily separated, *albipes* having pale grey wings recalling those of *Criorrhina*, while *austeni* has the wings rather dark yellowish-brown, and is very like a *Bombus* in general appearance, having the abdominal pubescence strikingly divided into three sections, respectively bright yellow, black and orange-red.

215. **Lycastris albipes**, *Walk.*

Lycastris albipes, Walker, Trans. Ent. Soc. Lond. (n. s.) iv, p. 155 (1857).
Lycastris flavohirta, Brunetti, Rec. Ind. Mus. ii, p. 85 (1908), and i, pl. xi, fig. 16, abdomen, fig. 17, wing (1907).
Xiphopheromyia glossata, Bigot, Wien. Ent. Zeit. xi, p. 161 (1892).

♂ ♀ *Head*, including the frontal extension and excessively produced rostrum, varying from yellowish-brown to nearly wholly shining black, sometimes with a lighter or darker stripe along sides of rostrum. The produced lower part of the head forming the rostrum varies in length from a little shorter than, to nearly 1½ times as long as, the height of the eyes. Proboscis black. Antennæ pale to dark red-brown, arista bare. Eyes bare, contiguous for a very short space (about 10 facets); vertical triangle dark grey to black, with some long pubescence which may be blackish, brownish or bright yellow; ocelli yellowish to dark red. Occiput yellow-dusted, with upper half without pubescence, but with yellow pubescence, gradually lengthening, beginning at about middle and conspicuous when seen from in front. In ♀, frons and face gradually widening, at vertex about one-seventh of the full width of the head, at just below antennæ about one-third, mainly yellowish, with traces of a broad dark median stripe. *Thorax* from yellowish-grey to nearly black; covered, as are also pleuræ and scutellum, with dense and rather long bright yellow pubescence, which is paler or even whitish on pleuræ; scutellum more or less yellowish. *Abdomen* blackish with an æneous, cupreous, or deep blue tinge, the whole surface covered with dense, pale to bright yellow, pubescence, which is mainly erect on the discs of the segments and somewhat depressed on the hind margin of each; anterior margin of 2nd sometimes in the shape of two narrow elongate spots, and anterior corners of 3rd segment sometimes pale. Venter blackish or pale in individuals, with pale yellow or whitish pubescence. *Legs*: coxæ black; anterior legs mainly yellow; basal half of anterior femora black; tips of anterior tarsi black. Hind femora black, tips pale yellow, as is also the basal half to two-thirds of the hind tibiæ; rest of hind legs blackish or dark brown. Pubescence of legs bright yellow to whitish. *Wings* grey, a little brownish suffusion along the "cross-veins" in the middle of the wing, over the anterior cross-vein and anterior part of the wing-tip. Supernumerary veinlets

in subcostal cell about six in number but variable; squamæ and halteres small, yellowish-grey.

Length, 14–17 mm. to tip of snout.

Redescribed from the type ♀ from India; the type ♂ ♂ of *Xiphopheromyia glossata*, Big., from Sabatoo, India; and two ♂ ♂ of my *L. flavohirta*, from Sureil and near Sureil, 6000 and 5000 ft., 11–31. x. 1917 and 18. x. 1917 (*Annandale & Gravely*). I have seen it from Mussoorie, ix and x. 1906; Darjiling, 10–15. ix. 1905 (type of *flavohirta*, Brunetti) and 25. ix. 1906.

Type (♀) of *L. albipes*, Walk., in British Museum. The type of *L. flavohirta*, Brun., is in the Indian Museum, and the two ♂ ♂ of *X. glossata*, Big., are in the Bigot Collection.

A close study has been made of the type ♀ of *L. albipes*, the two ♂ ♂ on which Bigot set up his *X. glossata*, and two ♂ ♂ of my *L. flavohirta*, also a ♂ and a ♀ of *L. cornutus*, Enderl., sent by the Budapest Museum; all the specimens are in excellent condition. There seems no doubt of the synonymy of the first three, whilst the validity of *cornutus* rests practically on the single character of its having dense black pubescence on the black parts of the femora. *L. albipes* is a variable species, the length of the produced rostrum varying from less than the height of the eyes to nearly 1½ times as long. The yellow anterior margin (sometimes resolved into two elongate spots) of the 2nd abdominal segment may be present or absent, and the colour of the abdomen itself is also variable. The insect very closely resembles the bees *Bombus vallestris*, Smith, and *B. flavescens*, Smith.

216. **Lycastris austeni**, sp. nov.

♂ ♀ *Head*: in ♂, eyes not absolutely contiguous, but practically so for five or six facets; vertical triangle black, with yellow dust and long, stiff, blackish-brown pubescence; ocelli red. Rest of head, including antennæ and arista, mainly shining, rather deep, chestnut-brown, darker still on upper side of frontal prolongation; proboscis black, when bent under body reaching nearly to tip of abdomen; tip of the bifid rostrum a little orange; an indistinct, narrow darker line on each side of rostrum. Occiput concave, black, with rather long, shaggy, black pubescence on lower part. *Thorax* black, with long, dense, black pubescence, which is much shorter and sparser on pleuræ: scutellum black, with dense, bright yellow pubescence. *Abdomen* black, with long, dense pubescence, of which that on basal third is yellow, on middle third black, and on apical third orange-red. Venter shining black, bare except for some long fine hairs. Genitalia in ♂ shining black, globular, with a little fine black, orange or red pubescence. *Legs* black or dark shining brown, knees yellowish, about basal half of middle tibiæ and basal part of middle metatarsi orange-brown; tips of hind tibiæ and the hind tarsi deep orange-red, with very short, dense, concolorous pubescence, and two or three closely-set longitudinal rows of tiny

black bristles. Pubescence of legs mainly black, rather long and dense, except towards base and tips, on posterior femora and tibiæ. Hind coxæ distinctly conically produced hindwards; a distinct blunt spine below hind femora towards tip in ♂, shorter and more tooth-like in ♀ *Wings* yellowish-grey; about anterior half yellowish-brown, the colour fading hindwards, leaving about apical half of 1st and 3rd posterior cells, and the discal, anal and axillary cells, paler. Halteres yellowish, with black knobs.

Length, 15 mm. to front of eyes, +5 mm. the produced rostrum.

Described from a perfect pair in the British Museum. Darjiling, 6000 ft., 26. iii. 1894, ♂; 7000 ft., v. 1894, ♀ (both *Col. Bingham*).

This large and handsome species was brought to my notice from a quantity of unnamed material by Major Austen, after whom I have pleasure in naming it.

Genus **CRIORRHINA**, *Meig.*

Criorrhina, Meigen, Syst. Beschr. iii, p. 236 (1822).
Heliophilus, Meigen, Klass. i, xx (1804).
Somula, Macquart, Dipt. Exot., Suppl. 2, p. 57 (1847).
Deineches, Walker, Ins. Saund., Dipt. i, p. 227 (1852).
Chriorhyna, Rondani, Dipt. Ital. Prod. ii, p. 74 (1857).
Microrhincus, Lioy, Atti Isti. Veneto, (3) ix, p. 751 (1864).
Eriophora, Philippi, Verh. zool.-bot. Ges. Wien, xv, p. 735 (1865).
Brachymyia, Williston, Canad. Entom. xvi, p. 77 (1882).
Eurhinamallota, Williston, Proc. Amer. Phil. Soc. xx, p. 330 (1882); Bigot, Ann. Soc. Ent. France, (6) ii, Bull. p. lxxvii (1882).
Eurhynomallota, Bigot, op. cit. (6) iii, p. 225 (1883).

GENOTYPE, *Syrphus silicus*, Fall., by Westwood's designation, 1840.

Head rather flattened, a little wider than thorax (apart from pubescence of latter); eyes bare, not quite touching in ♂, distinctly though not widely separated in ♀; frons flattened, ending in an antennal prominence, below which the face is excavated distinctly, thence forming a large, stout snout, in which a central knob is moderately distinct. Antennæ moderately long, 3rd joint rounded or ovate, deeper than long; arista sub-basal, bare. *Thorax* elongate-oval, rather arched, scutellum concolorous, both densely pubescent without bristly hairs. *Abdomen* varying in shape from nearly rounded to a narrow ellipse, densely pubescent. *Legs* rather strong; hind femora sometimes thickened but normally without processes below*; hind tibiæ often curved, sometimes compressed. *Wings* with marginal cell widely open; anterior cross-vein far beyond middle of discal cell, very oblique.

Life-history. Verrall suggests that the metamorphoses may occur in the sap which flows from injured or ulcerated trees. The

* *C. dentata*, Brun., is in this respect an exception amongst Oriental species.

European *C. oxyacanthæ*, Meig., has been bred from mud and flood débris. Lundbeck (Dipt. Danica, v, p. 491, 1916) describes a puparium of this same species, found under moss on a tree-stump; it is nearly cylindrical, ventrally flattened, attenuated in front and behind, with short lateral filaments behind, and a posterior spiracular process about 1 mm. long.

Range. Europe, Siberia, Japan, India, North America, Chili.

Some closely allied genera or subgenera exist, which, however, do not touch the Oriental species. The groups in question are not at all well defined. *Deineches*, Walk., has contiguous eyes in

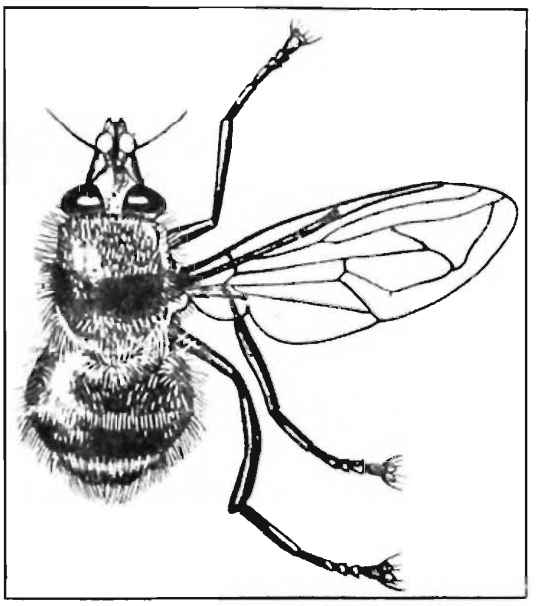

Fig. 54.—*Criorrhina imitator*, Brun., ♀.

the ♂, the snout produced diagonally, and dense pubescence like that of *Bombus*. The separation of even *Cynorrhina* from *Criorrhina* seems doubtful; the characters of contiguous or separated eyes in the ♂, direction of production of the epistome, thickening of the hind femora and even the presence of a tooth-like process, together with minor characters such as the degree of pubescence and shape of the abdomen, all vary so much as to make subdivision of the genus almost impossible if all the world's species be considered.

Table of Species.

1. Densely pubescent species, with a general resemblance to *Bombus*	2.
Moderately pubescent species, with more resemblance to *Apis*	4.
2. Wings mainly dark brown; eyes closely contiguous for some distance in ♂ .. .	*simioides*, Brun., p. 282.
Wings grey, slightly darkened anteriorly or along the veins; eyes slightly separated in ♂ (of *C. imitator*; the ♂ of *C. vivida* is unknown)	3.

3. Tarsi wholly black, epistome projected nearly directly downwards; length 17–20 mm.	*imitator*, Brun., p. 283.
Tarsi with first three joints rather bright orange; epistome projected diagonally; length 15 mm.	*vivida*, sp. n., p. 285.
4. Hind femora with a distinct tooth-like process below, near base; face with a median dark stripe	*dentata*, Brun., p. 286.
Hind femora without process below; face without stripe	*interrupta*, Brun., [p. 287.

217. **Criorrhina simioides**, *Brun.*

Deineches simioides, Brunetti, Rec. Ind. Mus. ii, p. 83 (1908).

♂. *Head*: vertex black. Eyes reddish-bronze, facets uniform, touching for only a short space above frontal prominence. Antennæ light reddish-brown, situated on a short black prominence. Snout produced. Face black, shining, with a greyish-dusted wide stripe on each side. Back of head blackish-grey, nearly bare. *Thorax* obscure blackish-grey (apparently). Humeral calli brown; a greyish stripe on sides. Scutellum blackish, hairy. The whole dorsum and sides of thorax clothed with thick blackish-grey and brown hair. *Abdomen* clothed with dense pubescence

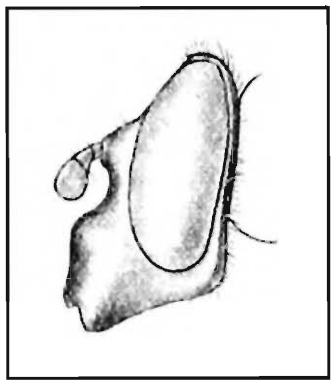

Fig. 55.—*Criorrhina simioides*, ♂, Brun., head in profile.

(recalling that of *Bombus*); it is yellowish on basal half (except on the extreme base, which is barer and apparently tawny), followed by a wide blackish band of hair; the tip of the abdomen being clothed with red hair. Venter blackish; the last segment covered with dense black and reddish hair. Genitalia black, shining. *Legs* reddish-brown; fore femora with a broad dark brown band near tip; middle pair with a black streak on inner under side, and a shorter one on outer side near tip; hind pair apparently unmarked. All the femora with more or less scattered

black hair, which on under sides becomes longer and bristly. All the tibiæ with short stiff black hairs. Tarsi with short black hair, mixed with some yellowish ones; under side of hind tarsi rich golden-brown. *Wings* brown; anterior half and basal half much darker; centre of 1st and 2nd posterior cells very slightly clearer. Halteres yellow.

Length, 18 mm. without snout.

Described from one ♂ in the Indian Museum collection. The species was described by me under the manuscript name given it by Bigot. It almost certainly comes from British India.

218. **Criorrhina imitator**, *Brun.* (Text-fig. 54, p. 281.)

Criorhina imitator, Brunetti, Rec. Ind. Mus. xi, p. 236, pl. xiii, fig. 14, full insect (1915).

♂ ♀ *Head.* In ♂, eyes very approximate for a short space only but by no means touching, vertical triangle black, with rather long pubescence which may be wholly brownish-yellow, or the pubescence itself may be orange on its basal half with the remainder black; ocelli blackish. Fronto-antennal prominence moderately large; frons below rather deeply cut away, face prominent, rather large, descending almost vertically to a length equal to about the height of the eyes. Frons and face covered with yellowish-grey tomentum or dust, with a little pale yellow pubescence on former and on upper sides of latter; cheeks wholly shining black, bare, as is also tip of epistome. Palpi nearly as long as proboscis, slender, tips only slightly dilated, pale brown, nearly bare. Antennal 1st and 2nd joints black, as is extreme anterior tip of frons; 3rd joint short and deep, reddish-orange, a little white-dusted, front edge blackish, arista black. Occiput moderately dusted with light grey, with long, rather shaggy pale or brownish-yellow pubescence. In ♀, frons and face diverging rapidly; at vertex about $\frac{1}{6}$ width of head, but much more than $\frac{1}{3}$ width of head at level of eyes; all dusted with yellowish-grey, distinctly more yellowish than in ♂ and scantier on upper side of epistome. *Thorax* shining black, greyish tinged anteriorly, where it is covered down to the suture with dense yellowish hair, which also occupies the hind margin more narrowly but with equal density; intermediate surface of dorsum with dense black hair; pleuræ with similar pubescence, which is yellowish in ♂ and black in ♀; scutellum with very long, dense, similar, yellowish pubescence. *Abdomen*: ground-colour mainly black, more or less dark grey basally, its whole surface with long, dense pubescence varying considerably in colour with the individual, the basal third a paler or deeper yellowish or reddish-yellow, the remainder may be wholly black, or the middle third black, with the apical third bright orange-red. In one ♂ the whole pubescence of the abdomen is yellowish, a little more reddish apically. Normal form probably with yellowish basal pubescence, and the remainder either all black or black on about middle third.

Genitalia in ♂ conspicuous, curved well under venter. *Legs*: femora black, with long, dense pubescence, which may be all yellowish or all black. Tibiæ mainly black but indefinitely dull reddish-brown basally and apically; pubescence short, black; middle pair of tibiæ rather irregularly shaped, ending (in ♂ only) in a slender, spine-like tooth; tarsi black or dark brown; middle metatarsi in ♂ with a pair of small black spines below, just beyond base, and with several at tip; 2nd tarsal joint with a few apical spines. *Wings* yellowish-grey, pale brownish anteriorly; veins black, all barely perceptibly, but broadly, brownish-infuscated, giving a slightly brownish tinge to the wing. Stigma a little darker brown; alar squamæ blackish, thoracic squamæ yellowish-grey, both pairs with yellowish fringe; halteres yellow, clubs black.

Length, 17–20 mm.

Described originally from a single ♀ from Onari, Garhwal District, W Himalayas, 11,000 ft., 27. vi. 1914 (*Col. Tytler*) and redescribed more fully from several of both sexes taken by Col. Nurse in Kashmir, 8000–9000 ft., vi. 1901. Other specimens seen from Andarbon, Garhwal District, 11,000 ft., vi. 1914.

Type (♀) in Indian Museum.

A very handsome species and the largest known in the East. I am fully convinced that all the specimens referred to represent but a single species in spite of the considerable variation in colour of the pubescence. The colour of the femoral pubescence does not always agree with that of the abdomen: *e.g.*, of two ♂ ♂ with mainly blackish abdominal pubescence, one has the femoral pubescence also wholly black but the other has it all yellowish.

A very interesting case of double mimicry appears in connection with this species. *C. imitator* itself closely resembles several humble-bees of more or less common occurrence in the Himalayas, and possesses the not unusual colour-pattern of a broad band of dense, long yellowish pubescence on the anterior and hinder thirds of the thorax, covering also the scutellum, and a similar broad band on the basal third of the abdomen, the tip of the latter being covered to a varying distance with dense bright orange-red pubescence, and the remaining surface bearing wholly black pubescence. Several humble-bees of South and Western Europe, Sikkim, Tibet and the Himalayan Region generally, possess this pattern of coloration. These are *Bombus vorticosus*, Gerst., distributed from South Europe to the Pamirs; *B. pyropygus*, Friese (variety of *orientalis*, Smith), from Sikkim; *B. montanus*, Lep. (variety of *alticola*, Kris.), from Sikkim and Tibet; and the typical form of *B. alticola* itself from North and Western Europe, represented in the British Museum from Switzerland, Armenia and Siberia amongst other localities. There is also a close resemblance between *C. imitator* and the Syrphid fly *Lycastris austeni*, sp. nov.*

* Described in this volume, p. 279.

Besides the mimicry of the bees by *C. imitator*, it itself is closely resembled by a large Œstrid, *Portschinskia przewalskyi*, Ports.* In size and coloration the Œstrid is almost indistinguishable at a short distance from both the *Criorrhina* and the *Bombi*.

219. **Criorrhina vivida**, sp. nov.

♀ *Head*: frons black, with face gradually widening; at vertex from $\frac{1}{6}$ to $\frac{1}{7}$ of head, at level of antennæ distinctly less than $\frac{1}{3}$; frons and upper part of face a little grey-dusted, but nearly bare and shining at vertex and on a transverse space reaching from eye to eye at base of antennæ. Frons with fine black hairs, longer on vertex; long bright yellow post-vertical hairs; ocelli conspicuous, ruby-red; tip of frons orange-yellow. Antennæ brownish-orange, tip of 1st joint blackish. Epistome directed only moderately forwards, about as long as height of eyes, shining dark mahogany-brown, bare. Proboscis black, distinctly longer than head. Occiput ash-grey, with short yellow and black hairs intermixed behind vertical margin, and moderately long blackish-brown hairs on lower part. *Thorax*: ground-colour anteriorly grey, with yellowish-grey dust and bright yellow pubescence, followed by black pubescence; hind margin with yellow or orange-yellow pubescence; scutellum with yellow pubescence, all the pubescence long and dense. *Abdomen*: ground-colour of 1st and of basal half of 2nd segment ash-grey, with pale yellow pubescence; rest of 2nd segment and greater part of 3rd black, with concolorous pubescence; rest of abdomen yellow-dusted, with orange-red pubescence which encroaches a little on 3rd segment; all pubescence very long and dense. Venter shining black, with fine, whitish-yellow pubescence and black pubescence towards tip. *Legs*: femora black except the tips, which, with the rest of the legs, are orange-brown; the tibiæ rather darker, the tarsi rather paler. Pubescence of femora mainly black except some fine pale hairs on under side, that of rest of legs almost microscopic. *Wings* very pale grey, just perceptibly suffused over divergence of 2nd and 3rd veins; stigma pale yellow; halteres dull orange.

Length, 15 mm.

Described from a single (*type*) ♀ from Kashmir, vi. 1901 (*Col. Nurse*), presented to the British Museum. A ♀ in the British Museum from N.W. India in bad condition may be identical, but the pubescence of the anterior part of the thorax is wholly black, the ground-colour of the apical third of the abdomen is more orange-red than yellow, and the orange-red pubescence is more extensive.

Two ♂ ♂ in the same collection from the Runjit Valley, Sikkim, v. 1894 (*Bingham*) represent, I think, the male sex of *vivida* or a closely allied new species. The epistome is thickly yellow-dusted on upper half, sharply defined from the bare shining

* For description and notes, see p. 402.

blackish-brown lower part. The pubescence on the anterior and hinder parts of the thorax is yellowish-grey, the ground-colour of the anterior part less pale; the wing-veins are rather more infuscated. The hind femora are moderately thickened on under side towards tip, bearing some stiff black hair there, the rest of their pubescence being yellowish. Both the hind femora and hind tibiæ have a somewhat crooked appearance. The specimens appear to have been in spirit.

220. **Criorrhina dentata**, *Brun.*

Criorhina dentata, Brunetti, Rec. Ind. Mus. ii, p. 87, figs. head, abdomen, hind leg (1908).

♂. *Head*: antennal protuberance rather prominent, face much excavated below antennæ, and bearing a central knob. Eyes black, sub-contiguous for only a very short space, facets smaller round the outer parts. Vertex moderately narrow, raised, black, with long black hair in front, and tawny-brown hair behind, on posterior edge. Face dull yellowish, with, seen from above, a silvery-white dusted reflection; upper side of antennal prominence shining black. Antennæ red-brown; a few hairs on upper

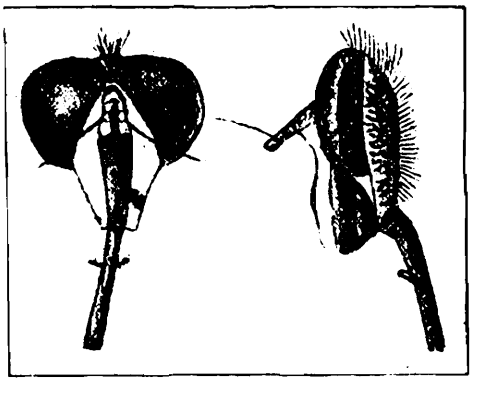

Fig. 56.—*Criorrhina dentata*, Brun., ♂, head in front and side view.

side of basal joints; arista orange, bare. Whole side of the produced snout, from eyes to tip, shining black, bare; a central wide bare shining brown stripe from base of antennæ to tip of snout; mouth black, proboscis dark brown, rather long. Back of head grey; posterior orbit of eyes with a fringe of grey hair which is shortest behind the vertex and longest on under side. *Thorax* æneous, with a slight reddish-coppery tinge, closely covered with thick, long, light brown hair, which extends over the concolorous scutellum, but is almost absent at base of latter, and longest of all and erect on its posterior border. Sides of thorax blackish-grey, shining, with thick long brownish-grey hair. A small yellow callus a little below the shoulder, bearing apparently microscopic cream-coloured pollinosity. A small oval callus, hollowed in centre, above each hind coxa, bearing very short

cream-coloured pubescence. Metanotum shining black, bare, *Abdomen*: 1st segment dull bluish-grey, blackish at base with a bunch of pinkish-brown hairs in the centre of the posterior border; 2nd, 3rd and 4th segments with the basal half sub-metallic dull bluish-black, and the apical half sub-metallic brownish-black with a light brown posterior edge (widest on 4th segment). Each segment is indented transversely by a narrow grey band bearing short grey hair, the hair in front of it being light brownish-grey and that on apical half brownish-black. Tip of abdomen with brown hairs; genitalia black, concealed, globular, with black hairs. Venter blackish, with greyish hairs, posterior borders of segments tawny. *Legs*: coxæ blackish, fore pair with whitish reflection and grey hair; hind pair yellowish, streaked with black above, with yellowish-grey hair below. Femora black, extreme tips orange-yellow, basal half of middle pair below, and

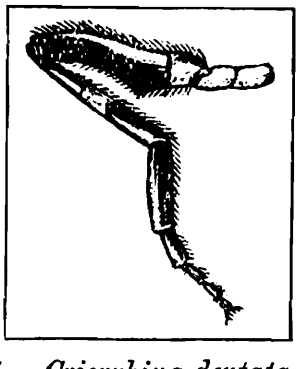

Fig. 57.—*Criorrhina dentata*, Brun., ♂, hind leg.

a basal band on hind pair, orange-yellow. The hind femora are barely thicker than the others and bear a distinct wide tooth on the under side near the base. All the femora covered with a considerable amount of light greyish hair, mixed with some brown hairs, the under sides bearing the longest hair. Tibiæ: rather more than basal half of anterior pairs brownish-yellow, the rest black, hind pair nearly all black; all with short whitish hair. Tarsi: anterior four brownish-yellow, with darker tips and traces of a darker central line; hind pair dark brown, with the upper side mainly black. *Wings* pale grey; stigma dark brown; cross-veins lightly suffused for a small space with brown. Halteres yellow. Squamæ transparent white, with yellowish-brown border bearing long white hair.

Length, 11 mm.

Described from a ♂ in the Indian Museum collection taken at Kodiali, Simla District.

221. Criorrhina interrupta, sp. nov. (Pl. V, fig. 11.)

♂. *Head*: eyes at point of nearest approach just perceptibly separated for a distance of four or five facets by a very narrow shining black bare line; vertical triangle black with black hairs

and a little yellowish-grey tomentum. Eyes bare, facets of uniform size. Frons wholly formed of the antennal prominence, and, with face, covered with greyish-yellow tomentum; a few pale hairs along lower eye-margin. Lower half of epistome dark shining brown, bare. Antennæ and arista bright orange. Occiput yellowish-grey with long white pubescence on lower part, with practically no pubescence behind middle of eyes and with short pale yellow pubescence on upper parts, with which are intermixed on each side of the vertex about half-a-dozen longer, black, well separated hairs curved forward, whilst there are also some long yellow post-vertical hairs. *Thorax*: ground-colour slightly shining black, covered with yellowish tomentum and dense long yellowish-grey pubescence, with a few dark brown hairs intermixed in centre of dorsum. Scutellum concolorous with still longer erect yellow pubescence. Sides of thorax with yellowish-grey tomentum and long yellow or whitish pubescence. *Abdomen*: 1st segment yellowish-grey tomentose with a little pale pubescence at sides; 2nd segment reddish-brown, paler in front and almost yellowish towards anterior corners; 3rd and 4th segments dark shining mahogany-brown with a grey tomentose narrow transverse band across centre, interrupted in middle, reaching side margins on 3rd segment but not on 4th; hind margins of 2nd, 3rd and 4th segments narrowly yellowish-grey. Whole dorsum with dense, short, yellowish-grey pubescence. 5th segment dark brown, twisted sideways to the left, so that the very large, moderately shining, globular, basal part of the black genital organs is very prominent, bearing black pubescence, the appendages well developed but concealed below abdomen. Venter yellowish; at base and tip broadly blackish with an indefinite median stripe. *Legs* brownish with whitish pubescence, which is very long on hind pair. Femora shining dark brown, extreme tip orange, all with outer and under sides bearing long yellowish-grey or even whitish pubescence; hind femora distinctly and uniformly but not greatly thickened. Tibiæ brownish-yellow; apical half distinctly darker; hind pair slightly curved and distinctly compressed a little before tip; tarsi all orange-brown; tibiæ and tarsi with microscopic yellow pubescence. *Wings* pale grey; brownish on stigmatic region; an indefinite streak thence to base of discal cell; also anterior cross-vein irregularly suffused. Halteres brownish-orange.

Length, 12 mm.

Described from a unique ♂ from the Pusa collection taken at Dungagali, Hazara District, 8000 ft., 21–24. v. 1915 (*Fletcher*). *Type* sent to British Museum.

This species bears some resemblance to *C. asilica*, Fall., of Europe. It closely resembles my *C. dentata*, but is at once differentiated by the absence of the tooth-like process below the hind femora. Other points of difference lie in the facial bump, which is more gradual and less prominent than in *dentata*, and in the reddish-brown 2nd abdominal segment.

Genus **ARCTOPHILA**, *Sch.*

Arctophila, Schiner, Wien. ent. Monatschr. iv, p. 215 (1860).

GENOTYPE, *Syrphus bombiformis*, Fall.; by designation of Williston, N. Amer. Syrph. p. 158 (1886).

In describing this genus, Verrall adopts Schiner's original words, and they are repeated here. "The genus *Arctophila* is distinguished from *Sericomyia* by the denser, almost fur-like pubescence of the whole body, by the formation of the face, and by the shape of the abdomen, which is shorter, broader and more arched than in *Sericomyia*. Also the hind femora in *Arctophila* are always strongly thickened and, as are also the tibiæ, strongly curved. The face is straight and is extended widely downwards

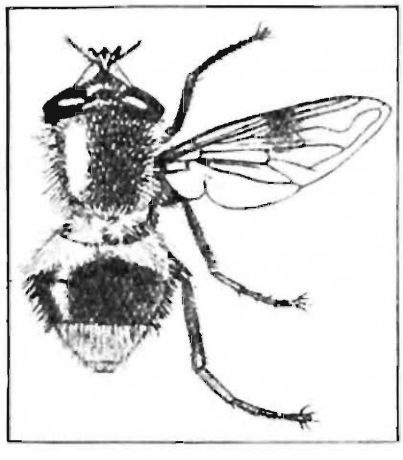

Fig. 58.—*Arctophila simplicipes*, Brun., ♀.

conically far below the eyes, it is not blunt at the end, as in *Sericomyia*, but pointed, the proboscis, which is not longer than the mouth-front, has furthermore long and very narrow suckers and the wings always have a brown blotch on the middle." The 3rd vein is looped in the 1st posterior cell in one North American species.

Range. Europe, India, North America.

Life-history apparently unknown.

A very restricted genus, only one species being Indian.

222. **Arctophila simplicipes**, *Brun.*

Arctophila simplicipes, Brunetti, Rec. Ind. Mus. xi, p. 247, pl. xiii, figs. 16, full insect, 17, hind leg, 18, arista (1915).

♀ *Head*: frons blackish-æneous, with a transverse groove at base of antennal prominence, which is of the same colour; both frons and prominence covered with rather long yellowish hairs, intermixed on vertex with black hairs. The dull reddish ocelli are placed flat on the vertex. Face blackish, with whitish tomentum and microscopic pubescence, and some long soft white hairs along

inner orbit of eyes; a nearly bare irregular median stripe on face. Cheeks and under side of head blackish, with soft, comparatively short yellowish hairs. Proboscis blackish. Antennæ dull dark brown, 3rd joint with greyish tomentum, arista brownish-yellow, with 16 or 17 long hairs along the entire upper side and about 12 shorter hairs on apical half of under side. Occiput blackish-grey with a little minute yellow pubescence; some long brownish-yellow hairs behind vertex and yellowish-grey hairs on

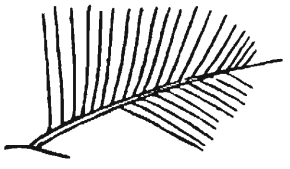

Fig. 59.—*Arctophila simplicipes*, Brun., arista.

under side. *Thorax* black, barely shining, with a pair of median, moderately narrow, barely perceptible, greyish stripes and a narrower one between them. The whole dorsum and the scutellum covered with thick long canary-yellow pubescence, except narrowly on anterior margin. The pubescence extends thickly over the vicinity of the mesopleura. *Abdomen* moderately shining black, with thick yellowish pubescence on anterior corners, and bright red pubescence on major (apical) part of last segment and on the

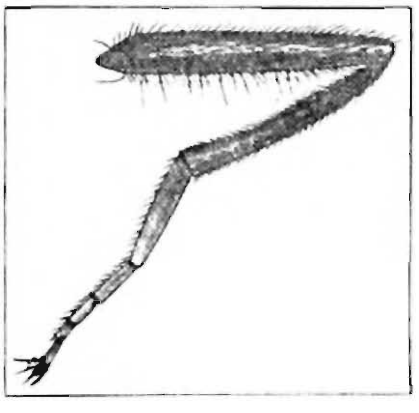

Fig. 60.—*Arctophila simplicipes*, Brun., hind leg.

concolorous red genitalia. On the rest of the dorsum the pubescence is black, short and very fine; a little longer on hind borders of segments and obviously long and thick on the sides. Venter black, with short sparse yellowish hairs, hind margins of segments narrowly pale, last segment red. *Legs* black, tarsi reddish; femora mostly covered with short black pubescence, but with a few longer fine hairs below; rest of legs with minute black pubescence, some short yellow pubescence on outer side of middle tibiæ. *Wings* grey, a moderately wide dark brown band from middle of

anterior margin to a little beyond the 4th longitudinal vein. Halteres blackish; squamæ brownish, with fringe of brown hair.

Length, 12–13 mm.

Described from several ♀ ♀ in the Indian Museum from the Garhwal District, Kumaon, 11,000 ft., 20. v–20. vii. 1914.

Arctophila, according to Schiner, its founder, should have considerably thickened hind femora and curved hind tibiæ, but Verrall in describing *A. mussitans*, F., says, "hind femora rather thick, hind tibiæ slightly curved"; as, therefore, the characters are not so pronounced in the latter case, the present species is referred to this genus, though the hind femora and tibiæ are but little thicker or more curved respectively than the others. The genus is, however, otherwise sufficiently characterised.

Genus **SERICOMYIA**, *Meig.*

Sericomyia, Meigen, Illig. Mag. ii, p. 274 (1803).
Sericomyza, Zetterstedt, Ins. Lapp., Dipt. p. 589 (1838).

GENOTYPE, *Musca lappona*, L.; by designation of Latreille, 1810.

Head as wide as or slightly wider than thorax. Eyes bare, contiguous in ♂ for a considerable space, wide apart in ♀; face slightly hollowed below antennal prominence, thence forming a large or moderate sized snout; mouth-border moderately produced; antennæ rather short, 3rd joint rounded or subquadrate,

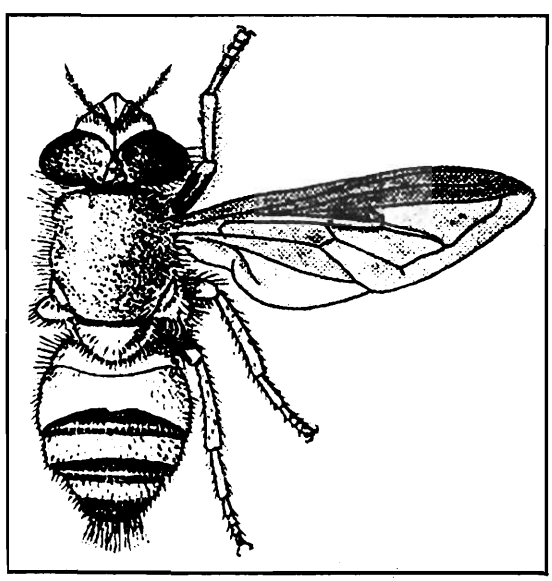

Fig. 61.—*Sericomyia himalayensis*, Brun., ♂.

arista sub-basal, very plumose. *Thorax* subquadrate, robust, sparsely or moderately pubescent. *Abdomen* wider and longer than thorax, ovate, moderately arched, generally blackish, with transverse yellow spots. *Legs* strong, hind femora and tibiæ slightly bent, former sometimes thickened. *Wings* with venation

typical of MILESIINÆ; marginal cell widely open; anterior cross-vein at middle of discal cell, oblique; 1st posterior cell closed some distance before wing-border.

Life-history. *S. borealis*, Fall., a European species, breeds in decomposing peat.

Range. Europe, Siberia, Caucasus, India, North America.

A well-marked genus, conspicuous by its plumose arista and its venation.

Table of Species.

Central bump on snout barely perceptible, practically absent	*himalayensis*, Brun.
Central bump on snout long and obvious, but not conspicuous	*eristaloides*, Brun.

223. **Sericomyia himalayensis**, *Brun.*

Sericomyia himalayensis, Brunetti, Rec. Ind. Mus. ii, p. 89 (1908); i, pl. xiii, figs. 6, full insect, 7, antenna, 8, hind leg (1907).

♂ Entire frons and lower part of head bright yellow, with some yellow hair immediately below eyes, at the sides of the cheeks, and on lower part of head behind; central bump barely perceptible; eyes comparatively rather small, contiguous for only the shortest space, facets very small, especially on lower part, but with no distinct line of demarcation; vertex very small, slightly raised, with a few black hairs; a few black hairs also just above the antennæ, which are rather small, black and plumose above and below. *Thorax* yellowish-grey, entirely covered with moderately thick yellow hair, which is longest at the sides and on the posterior border; dorsum cinereous, with short yellow pubescence, and black hairs in the centre, this pubescence being hardly visible from above. Scutellum tawny, with rather long yellow hair. *Abdomen* bright yellow with a black band, indistinct in the middle, on the posterior borders of 2nd, 3rd and 4th segments; the whole abdomen with minute yellow pubescence and some longer yellow hair at the tip; venter bright yellow. *Legs* tawny, with thin yellow hair; femora (except tips) brownish, hind pair nearly black; tips of tarsi brown. *Wings* pale grey, a dark brown moderately broad band from beyond the tip of the costal cell, reaching from the fore border to the upper part of the discal cell and the lower transverse vein.

Length, 12 mm.

Described from one ♂ from Sikkim in the Indian Museum collection.

224. **Sericomyia eristaloides**, *Brun.*

Sericomyia eristaloides, Brunetti, Rec. Ind. Mus. viii, p. 167 (1913).

♀. *Head:* frons barely projecting in profile beyond eyes; face moderately swollen, snout elongate, central bump distinct but not conspicuous; haustellum somewhat thick and long; mouth-parts

blackish; frons, at level of antennæ, $\frac{1}{3}$ width of head, narrowing considerably at vertex; upper half barely shining, black; ocelli distinct, red, set on the surface of the frons, enclosed by a slightly impressed line; lower half of frons with brownish-yellow dust. The whole frons with long soft black hairs, which towards and on the vertex become dark brown. Whole under side of head, and face from level of the antennæ, yellowish-pollinose, the central bump dark brown (a little lighter in the centre), with a fairly wide black stripe on each side of it. Some black hairs towards sides of central bump, and a little short bright yellow hair on the other parts of under side of head, including the two black stripes. Antennæ without any protuberance; a small shining rich mahogany-brown triangle immediately above and contiguous to their roots. 1st antennal joint shining black, 2nd nearly quadrate, viewed from in front, with a few stiff black hairs, 3rd joint much wider than 2nd, twice as long, quite bare, dark reddish-brown, oval, with a little whitish dust on under side; arista long, yellow, plumose above and below, the upper rays distinctly the longer. Occiput ash-grey, nearly whitish on margins, which on upper half of head do not project beyond the margin of the eyes themselves, but which do so on the lower half, where they bear long white hair. *Thorax* dull brownish, barely shining, and with sides brownish-grey; the whole rather thickly covered with yellowish-brown hair. Scutellum brownish-yellow, paler on hind margin; dorsum with brown hairs at base which become yellow and longer towards the tip; under side with a fringe of soft whitish-yellow hairs. *Abdomen*: 1st segment whitish-yellow, remainder blackish; 2nd yellowish on anterior corners, 2nd, 3rd and 4th with an uninterrupted rather narrow yellowish band just before the middle and reaching the lateral margins or nearly so; all the bands of the same width; 5th segment entirely black; some long, soft yellow hairs at the sides at the base. Surface of abdomen with very short pubescence concolorous with the ground-colour; a fringe of very short yellow hairs on hind margin of each segment, most conspicuous on the 4th segment, and the extreme edges of the segments themselves, brownish-yellow. Genitalia consisting of a short cylindrical tube, from which emerge two oval brownish-yellow lamellæ. *Legs*: coxæ black. Fore femora black, with a yellow streak on hinder side, middle femora yellow, with a wide black streak on front side, hind femora with basal half brownish-yellow and apical half black; all the femora with a little pale yellow hair; the hind femora with a number of stiff black bristles of different lengths below, on apical half. Tibiæ mainly black, fore pair at base, and middle pair at base and tip, yellowish; hind tibiæ black; all tibiæ with close pubescence, which is brownish-yellow on the front side of the fore tibiæ, and whitish on the hinder side, where it is much longer; hind tibiæ with very short pubescence which is black in front and whitish on hinder side. Tarsi black or dark brown, with short golden-yellow pubescence; hind pair with rich golden-brown pubescence below. *Wings* pale grey; a small

brownish-yellow infuscation in middle, extending from the costa and the brown stigma and reaching to the 4th longitudinal vein; squamæ and halteres brownish-yellow.

Length, 13 mm.

Described from a single ♀ taken by Mr. S. Kemp between Renging and Rotung, N.W Frontier of India, 2200 ft., 20. xi. 1911. A true *Sericomyia* with the general appearance of *Eristalis*.

Type in the Indian Museum.

Subfamily CHRYSOTOXINÆ.

Antennæ porrect, elongate, arista normally dorsal, rarely with an apical style; anterior cross-vein normally before middle of discal cell; marginal cell open.

This subfamily, like the MILESIINÆ, is by no means a satisfactory one nor is its position, as such, at all well established. Originally *Chrysotoxum* was included by Schiner in the CHRYSOGASTRINÆ, and, though the latter group is inadmissible as a subfamily, Verrall considered that *Chrysotoxum* would not be misplaced near *Syrphus* and *Xanthogramma*. The value of both the position of the anterior cross-vein and the elongate or porrected nature of the antennæ may be over-estimated, especially the latter.

Table of Genera.

Antennæ with a dorsal arista	CHRYSOTOXUM, Meig., p. 294.
Antennæ with an apical style	CALLICERA, Panz., p. 303.

Genus **CHRYSOTOXUM**, *Meig.*

Chrysotoxum, Meigen, Illig. Mag. ii, p. 275 (1803).
Mulio, Fabricius, *nec* Latreille, Syst. Antliat. p. 183 (1805).

GENOTYPE, *Musca bicincta*, L.; by Latreille's designation, 1810.

Head semicircular, as broad as thorax; eyes pubescent, but in some cases indistinctly so, contiguous for a long space in ♂ but well separated in ♀; frons prominent, generally black with lateral yellow dust-spots; face very prominent, not at all cut away below the antennal prominence, descending perpendicularly and only gently curved outwards above upper mouth-border. Antennæ long, placed in profile at the limit of the produced frons and upper limit of face, the three joints in many species roughly subequal in length; in other species, 2nd a little longer than 1st, 3rd distinctly longer than 2nd; 1st cylindrical, slightly wider at tip, 2nd rather similar but proportionately broader at tip, longer on lower side, both with bristly hairs, 3rd bare, roughly cylindrical, arista bare, sub-basal. *Thorax* roughly oblong, finely punctate, black with yellow side lines and spots, and a pair of rather indistinct greyish stripes on anterior part of dorsum. Pubescence fairly dense; scutellum similarly clothed, yellow, base more or

less black. *Abdomen* ovate or elongate-ovate, often well arched, finely punctate, generally with a pair of curved yellow spots on 2nd to 5th segments. *Legs* simple, mainly yellow. *Wings* with venation of *Syrphus*, but 3rd vein sometimes more inclined to form a downward bend into the 1st posterior cell; alulæ large.

Life-history unknown, but it is suspected that the early stages are passed in rotten wood or in the diseased sap of trees.

Range. Europe, Central and South Asia, Siberia, North Africa, Orient, North America, West Indies.

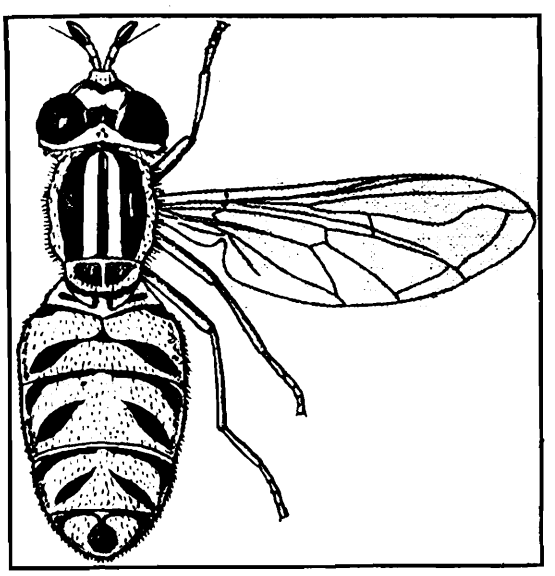

Fig. 62.—*Chrysotoxum baphyrus*, Walk. (*sexfasciatum*, Brun.), ♀.

A very well-defined and conspicuous genus of rather large flies, frequently black and with pairs of curved yellow spots on the abdomen. The long antennæ, the yellow markings of the body, the nearly wholly yellow legs, the yellowish anterior portion of the wings and the rather faint greyish stripes on the thorax, with the typically Syrphid venation, combine to make the genus easily distinguishable once it has been recognised. The adult flies love the sunshine and are generally distributed in sunny spots, borders of woods and similar situations, though they are very seldom actually common. The relative lengths of the antennal joints are not given, as the differences do not seem to warrant their being regarded as of specific importance.

Table of Species.

1. Abdomen with 2nd, 3rd and 4th segments with a definite (though sometimes small or relatively indistinct) yellowish triangle on hind margin, generally quite obvious and large, and always so on at least one or two segments ... . . 2.

   Abdomen without any of the segments bearing such a hind marginal triangle. 3

2. Second abdominal segment mainly yellow (as is whole abdomen), with a median transverse black line and a short vertical stripe above it joined to a narrowly black anterior margin . . . . . *baphyrus*, Walk., p. 296.

Second abdominal segment mainly black, with two transverse, elongate, yellow, median spots, pointed at their inner ends; hind margin of segment yellowish or brownish-orange . . . . *convexum*, Brun., p. 298.

3. Pairs of yellow spots on 2nd to 5th segments . . . . . 4.

Pairs of spots on at most 2nd and 3rd segments . . . . . 5.

Thoracic grey stripes carried beyond suture; scutellar spot well defined; abdominal spots lemon-yellow; femora wholly yellow; wings with an obvious but ill-defined blackish spot towards tip. *festivum*, L., p. 299.

Thoracic grey stripes ending at suture; scutellar spot ill defined; abdominal spots ochraceous; femora narrowly black at base; wings without trace of subapical spot. . *fuscomarginatum*, sp. n., [p. 300.

5. Fourth and 5th abdominal segments entirely black . . . . . 6.

Fourth abdominal segment with hind margin orange-brown; 5th with a large orange spot . . . . . *quadrifasciatum*, sp. n., [p. 300.

6. Abdomen black; 2nd and 3rd segments with a pair of nearly linear orange-yellow spots placed distinctly behind anterior margin; scutellum dull yellowish with a blackish spot . . . . . *antiquum*, Walk., p. 301.

Abdomen deep violet-blue; 3rd segment sometimes with a pair of linear whitish spots on anterior margin, but these are generally absent; scutellum bright lemon-yellow without sign of a black spot *violaceum*, sp. n., p. 302.

225. Chrysotoxum baphyrus, *Walk.*

Chrysotoxum baphyrus, Walker, List Dipt. Brit. Mus. iii, p. 542 (1849).
Chrysotoxum indicum, id., Ins. Saund., Dipt. i, p. 218 (1852).
Chrysotoxum sexfasciatum, Brunetti, Rec. Ind. Mus. ii, p. 89 (1908); i, pl. xiii, fig. 9, full ins. (1907).
Chrysotoxum citronellum, Brunetti, Rec. Ind. Mus. ii, p. 90 (1908).

♂ ♀. *Head*: vertex small, blackish, or with a bronze tint, with a little black pubescence; ocelli red, well separated. Eyes contiguous for half the distance from vertex to frontal triangle; latter small, black, with blackish-brown pubescence. Antennal prominence brown, blackish at base above; 1st and 2nd antennal joints orange-brown, 3rd joint black, base paler, arista orange-brown. Face lemon-yellow, sometimes tinged with greenish, with a

moderately wide black median stripe which is sometimes narrowly orange on each side; cheeks sometimes pale orange, with an indistinct blackish intervening stripe. Proboscis short, black. Occiput black, yellow-dusted, with yellow pubescence on upper part, whitish towards margins and with whitish pubescence on lower part. *Thorax*: dorsum black, with the usual two yellowish-grey median stripes; side margins rather broadly yellowish; pleuræ blackish with a brassy tinge and some yellow pubescence, a yellow spot of the usual kind on mesopleura and sternopleura. Scutellum lemon-yellow to rather brownish, with pale yellow to brownish pubescence. *Abdomen* nominally yellowish; 1st segment orange-brown; 2nd with an arcuate, transverse, rather narrow black line across middle of segment, the ends not quite reaching hind margin, a short vertical stripe connecting it with a narrowly black front margin; hind margin occupied by a very broad, low, somewhat orange-tinged area filling up the remaining surface of the segment. 3rd segment yellow, a pair of elongate, black,

Fig. 63.—*Chrysotoxum baphyrus*, Walk. (*citronellum*, Brun.), ♂, thorax and abdomen.

diagonally placed stripes, their inner ends pointed, nearly contiguous towards middle of anterior margin, a large orange triangular space on hind margin similar in colour to that of 2nd segment. 4th segment similar to 3rd; 5th segment black, with a pair of comparatively large yellow elongate spots placed diagonally, and a large orange-yellow apical spot. Pubescence of abdomen short, yellow, the margin with a fringe of short black hairs, anterior corners with yellow pubescence. Venter from orange to yellow, hind margins of segments black. *Legs* mainly yellow; fore coxæ yellowish, posterior pairs brown, with a little concolorous pubescence; hind femora in ♂ sometimes brownish apically, hind tibiæ sometimes with about apical half orange or brownish; hind tarsi sometimes brown. *Wings* pale grey, a little yellowish anteriorly; halteres pale yellow; squamæ whitish, margins orange, with a little yellow pubescence.

Described from the types of *baphyrus*, *sexfasciatum* and *citronellum*, and from a number of other specimens from various sources. Simla, 7000 ft., 9. v. 1910 (*Annandale*); Rampore

Chaka, Bijnor District, United Provinces, 23–31. xi. 1907 (type of *sexfasciatum*); North Bengal (type of *baphyrus*); Gudahir, Nilgiris, S. India, 6000 ft., 19. ix. 1917 (*Nagnath*); Yercaud, Salem, Madras Presidency, 27–29. x. 1913; between Rotung and Kalek, Abor Country, 2000–3500 ft., 14–15. iii. 1912 (*Kemp*); Kandy, Ceylon, xii. 1907 (*E. E. Green*, type of *citronellum*); Pundaluoya, Ceylon, iv and ix. 1893 (*E. E. Green*); Lower Ranges, Khasi Hills, Assam, 1878 (*Chennell*). *Type* of *baphyrus*, a ♂, in the British Museum; of *sexfasciatum*, a ♀, in the Indian Museum; of *citronellum*, a ♂, in my collection.

226. **Chrysotoxum convexum**, *Brun.*

Chrysotoxum convexum, Brunetti, Rec. Ind. Mus. xi, p. 249, pl. xiii, fig. 19, abdomen (1915).

♂. *Head*: frons with yellowish-grey dust; antennal prominence shining black, with black hairs, a few of which extend to the adjacent parts of the frons; antennæ black, arista reddish-brown on basal portion. Face bright yellow with a broad median black stripe; a black band from the corner of the eye to the mouth-border, which latter is reddish and shining. Under side of head yellowish-orange; proboscis dark brown with short yellowish hairs. Black hairs on vertex, and a fringe of yellow hairs along posterior orbit of eye. *Thorax* moderately shining black with

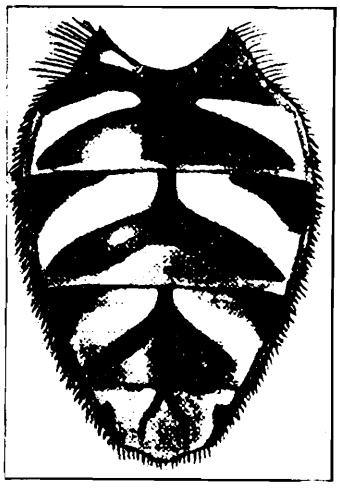

Fig. 64.—*Chrysotoxum convexum*, Brun., abdomen.

short sparse black pubescence, a few rather bright brown hairs in the middle of the disc. A pair of moderately narrow yellowish-grey median stripes on anterior border, extending only for a short distance. Humeri and posterior calli, together with a short lateral contiguous narrow stripe, bright yellow; a short stripe on the pleura just below but not touching the humerus, and the bases of the wings, a duller yellow. Scutellum bright yellowish-orange on anterior margin, orange-yellow on hind margin, the remainder, forming the bulk of the disc, moderately shining black. *Abdomen*

black, slightly shining; posterior border of 2nd, 3rd and 4th segments brownish-orange, the colour extending forwards in the centre of the 2nd and 3rd segments nearly to the middle of the disc; a pair of elongate triangular yellow spots on 2nd segment, placed at the middle of the sides, their apices nearly reaching the middle of the disc; a pair of moderately wide, slightly curved spots, with the convex side placed anteriorly, each extending from the hind corner of the 3rd segment to the anterior margin, where their ends nearly meet. The 4th segment similar, 5th mainly yellowish-orange, a narrow median line from anterior margin, forking early, the ends not reaching the apex. Base of under side of abdomen yellowish-white; a pair of oval yellowish spots placed transversely near anterior margin and near the sides of the 3rd and 4th segments; those on the 4th segment shorter, the hinder part of that segment more or less reddish-orange. Dorsal side of abdomen with black hairs except on the yellow markings, where the pubescence is concolorous. On the venter the whole pubescence is black. *Legs*: coxæ black with black hair; fore femora yellow, about the basal half black; other femora reddish-brown, middle pair more broadly, hind pair very narrowly, black at base. Tibiæ and tarsi orange-yellow, base of tibiæ more lemon-yellow. The femora bear short black pubescence, a little longer on the base, the hind pair have some very short yellow pubescence intermixed on lower side; tibiæ and tarsi with yellow pubescence. *Wings* grey, anterior margin narrowly brownish-yellow; halteres yellow; squamæ yellowish-orange, with deeper edges and yellow fringe.

Length, 14 mm.

Described from a single ♂ in the Indian Museum from Andarban, Garhwal District, W Himalayas, 11,000 ft., vi. 1914 (*Col. Tytler*). The brownish-orange of this species presents a contrast with the lemon-yellow colouring of *C. festivum*.

227 **Chrysotoxum festivum**, *L.*

Musca festiva, Linnæus, Syst. Nat., Ed. x, p. 593 (1758).
Musca bipunctata, Müller, Zool. Dan. Prodr. p. 174 (1776).
Musca imbelle, Harris, Expos. Engl. Ins., p. 60, pl. xv, fig. 16 (1782).
Syrphus arcuatus, Fabricius, Syst. Ent. p. 767 (1775).
Chrysotoxum scutellare, Loew, Progr. Posen, p. 26 (1840); Isis, vii, p. 558 (1840).
Chrysotoxum infuscatum, id., ibid.

♂ ♀ *Head* in ♂ bright lemon-yellow; vertex black, with a little black pubescence; frons shining black, with a little white dust above and at sides and with short black pubescence. Antennæ black. Face with a median black stripe; cheeks with a rather narrow black stripe, hinder part of cheeks varying from orange to whitish. Occiput grey-dusted, hardly projecting behind eye-margins, a short white fringe on upper part. In ♀, frons all black, a pair of large, very pale, yellowish-grey dust-spots just

above antennal prominence, contiguous with eye-margins. *Thorax* shining black, with a pair of median grey dust-stripes, extending well behind suture. A lemon-yellow spot on humeri, at ends of suture, above wing-bases and on hind corners of dorsum. Pleuræ with the usual spots on mesopleura and sternopleura, the 3rd spot immediately in front of wing-base, contiguous with mesopleura. Scutellum yellow, with a large, clear-cut black spot in middle. Thoracic pubescence brownish-yellow. *Abdomen* shining black; 2nd, 3rd and 4th segments each with a very clear-cut pair of narrow, lemon-yellow spots forming an arc but distinctly separated in the middle line, not reaching side margins, their inner ends near anterior margin of segment, their outer ends near hind corners; 4th segment with a narrow yellow hind margin, 3rd and 5th with traces of such. 5th segment with a pair of curved yellow spots of a similar nature but placed diagonally, their upper ends towards middle of anterior margin. Venter with a pair of transverse yellow spots on 3rd and 4th segments. Pubescence of abdomen mainly black, but longer and whitish on basal corners. *Legs* orange to tips; coxæ and trochanters black, basal half of tibiæ pale yellow; pubescence yellow. *Wings* pale grey; yellowish anteriorly on basal half; a rather large, distinct, but ill-defined blackish spot over 2nd vein just beyond anterior cross-vein. Squamæ orange, margins and fringe darker; halteres orange to yellow.

Length, 14 mm.

Described mainly from a ♀ from Bishopabad, Bihar, 19. v. 1911 (*N. C. Rothschild*). Verrall's description is also drawn upon for the ♂, as the species is common in Europe. It is also known from N. Africa and Siberia. The above ♀ in the British Museum is the only specimen from the East which I have seen.

228. **Chrysotoxum fuscomarginatum**, sp. nov.

♀ Very like *C. festivum*, L. Smaller; the grey thoracic dust-stripes ending at suture; the sternopleural spot whitish; the scutellar blackish spot distinct but its outline less well defined; the abdominal spots more ochraceous; hind margins of 4th and 5th segments more broadly ochraceous; femora narrowly blackish at base, hind pair inconspicuously blackish-brown about the middle. *Wings* uniformly moderately dark brown nearly to 3rd vein, without trace of a subapical blackish spot.

Length, 9 mm.

One ♀ from Chitral (*R. Hill*). In the British Museum.

229. **Chrysotoxum quadrifasciatum**, sp. nov.

♀ *Head*: frons from vertex to antennæ shining black, with a pair of large, oval, yellow-grey dust-spots contiguous with eye-margins, placed a little below middle of frons. Antennæ black, 2nd joint a little pale towards tip on inner side. Face brownish-

orange; a wide black median stripe and a rather indefinite one on cheeks, behind which the cheeks are paler yellow. Proboscis dark brown. Occiput flush with eye-margins except narrowly behind vertex, yellowish-grey with concolorous pubescence, a yellow fringe on all its margin. *Thorax*: dorsum shining black with a slight æneous tinge, the broad side margins wholly brownish-orange, but distinctly interrupted just behind suture. Pleuræ blackish; lower part with æneous or deep blue reflections; mesopleura with the usual elongated spot brownish-orange, the contiguous one smaller, placed just in front of root of wing; sternopleura with an orange spot. Scutellum yellowish. Pubescence of thorax brownish-yellow, rather dense and obvious, *Abdomen* black; 2nd and 3rd segments each with a pair of transverse, linear, orange spots forming a slight arc on or just behind anterior margin and not reaching side margins, their inner ends narrowly separated, 2nd pair broader than 1st; 3rd and 4th segments with narrowly brown hind margins, 5th with a rather large brownish-orange spot in centre. Abdominal pubescence all brownish-orange. Venter black, 2nd segment with a pair of transverse brownish-orange spots. *Legs* brownish-orange to tips of tarsi; except fore coxæ, fore femora narrowly at base, middle pair a little more broadly and hind pair nearly to tip, blackish. *Wings* yellowish-grey, anterior margin rather narrowly yellowish; 2nd vein with brownish or yellowish suffusion apically; halteres yellowish.

Length, 11–12 mm.

Described from two ♀ ♀ in the British Museum; Khasi Hills, Assam. This species is allied to *convexum* by the orange colour of its pale markings, but the abdominal spots are confined to the 2nd and 3rd segments only.

230. Chrysotoxum antiquum, *Walk.*

Chrysotoxum antiquum, Walker, Ins. Saund., Dipt. i, p. 218 (1852).

♂ ♀ *Head*: in ♂, eyes clothed with distinct short whitish pubescence, absolutely contiguous for a greater distance than height of vertical triangle; latter black, with blackish-brown pubescence. Frons mainly occupied by a shining black triangle with obvious black pubescence; front edge brownish-orange, sides dusted with yellowish-grey. Face chrome-yellow, with a rather broad median black stripe; a lateral dark brown stripe on cheeks. Antennæ wholly black. Occiput light grey, a yellow fringe on lower part. In ♀, upper half of frons shining black, the yellowish-grey dust-spots large, practically meeting the yellow face. *Thorax* rather shining black, with rather conspicuous brownish-yellow pubescence, which is a little longer than in most species. Two grey dust-stripes on anterior margin reaching to about suture; a chrome-yellow spot on humeri, at ends of suture, above base of wing and on hind corners, the latter spots practically united to

the concolorous yellow scutellum, which has only a trace of an elongate blackish transverse spot but bears obvious black pubescence. Pleuræ black, with a little obvious fine pale pubescence, rather longer than usual. The usual spots on mesopleura and sternopleura, the former with a contiguous small pre-alar spot. *Abdomen* black; 2nd and 3rd segments each with a pair of transverse, narrow, linear spots distinctly behind anterior margin, well separated in the middle line but not reaching side margins, placed not quite in a straight line. Abdominal pubescence black, that at the base brownish or yellowish. Venter black, yellowish at base, 3rd segment with a pair of large transverse yellowish spots; similar, smaller ones on 4th segment. *Legs* orange, front tibiæ more yellowish; basal half of femora blackish. *Wings* grey, rather yellowish-brown on about anterior third; blackish in stigmatic region and anteriorly on about apical half. Halteres and squamæ orange.

Length, 14 mm.

Described from the *type* ♂ (without antennæ), and a ♀ in good condition from Simla (*Sladen*), both in the British Museum. The locality from which the type was obtained was recorded simply as "India orientalis."

231. **Chrysotoxum violaceum**, sp. nov.

♂ ♀. *Head*: eyes in ♂ contiguous for fully half the distance from vertex to frons, with short whitish pubescence on upper part, rest almost bare; vertical triangle blackish with long black hairs curved forward and a little grey dust at sides. Frons shining black, except the very narrowly yellow-dusted space contiguous with eye-margins; bearing long black hairs. Antennæ black, 3rd joint as long as 1st and 2nd together, arista brownish-orange; antennal prominence shining black. Face very shining bright chrome-yellow, with brownish-yellow pubescence; a median bare, shining black stripe nearly one-third the width of the face. A bare moderately broad shining black stripe from lower corners of eyes to mouth-border, behind this stripe pale orange-yellow with short yellow pubescence. Proboscis black. Occiput with yellowish-white tomentum and a complete fringe of yellow hairs except where the black hairs replace them behind vertex. In ♀, frons less than one-fifth of head at vertex, widening gradually so that the face below the antennæ is twice that width, thence sides of face parallel. Eyes with only the sparsest very short white pubescence. Vertex with a large deep violet-black spot, between which and the antennal prominence are two obvious but not conspicuous pale yellowish-grey dust-spots, contiguous with eye-margins, nearly meeting in middle line and continued narrowly by eye-margins to the bright shining chrome-yellow face, which latter bears short soft yellow pubescence. A median, moderately broad shining bare black stripe from base of antennæ to tip of

upper mouth-border; sides of upper mouth-border dull translucent orange, and there is a small transverse whitish space between them and the shining dark brown stripe which separates this part from the shining cream-yellow lower part of head. *Thorax* shining blackish with a dark cupreous or violet tinge, minutely punctate; anterior half of dorsum with dense moderately short rich brown pubescence; that on sides and hinder half of dorsum black, and slightly longer; two yellowish-grey, rather narrow stripes on anterior margin disappearing hindwards before or at suture. Pleuræ shining black or æneous-black; mesopleura and sternopleura conspicuously cupreous. Bright, shining chrome-yellow calli placed as follows: one on humerus; an elongate one with a deep diagonal impression above wing-base; an elongate vertical one on hind half of mesopleura. Pubescence of pleuræ black, but with some yellow hairs intermixed on mesopleural calli. Scutellum bright lemon-yellow with no black spot. *Abdomen* deep shining violet, minutely punctate with dense erect short black pubescence, which in central part of hinder half of 2nd, 3rd and 4th segments is replaced by much shorter and exceedingly dense depressed pubescence. Side margins of abdomen very distinct; sometimes an elongate whitish spot on each side of anterior margin of 3rd segment; venter shining dark violet, with black pubescence. *Legs* yellow or orange-yellow; basal third of fore femora, basal half of middle femora, hind femora wholly (except at tip), black; tips of tibiæ and the entire tarsi brownish. Pubescence black on black parts, except for the very short whitish pubescence on hind femora; also black on yellow parts of tibiæ and on upper side of tarsi; on rest of legs it is short and yellow. *Wings* dark blackish-brown anteriorly, gradually fading hindwards to grey on hind margin; halteres dull orange.

Length, 12 mm.

Described from several of each sex in the Indian Museum from Sureil, Darjiling District, 5000 ft., 11–31. x. 1917 (*Annandale & Gravely*). One ♀ in the British Museum from Simla (*Sladen*). *Types* in the Indian Museum. A most beautiful species, closely allied to Walker's *C. antiquum*, though I feel convinced that it is really distinct.

Genus **CALLICERA**, *Panz.*

Callicera, Meigen in Panzer, Faun. Germ., p. civ, pl. 17 (1809).

Head short, slightly wider than thorax; face broad and produced, scarcely hollowed below antennæ but with middle knob and upper mouth-edge slightly produced; face densely pubescent, almost as in *Microdon*; jowls moderate in size; back of head shallow; vertex in ♂ very small; frons moderately produced, brilliantly shining and quite bare. Eyes hairy, especially in ♂, and touching in that sex for an unusually long space (about three times as long as vertex), but well separated in ♀ Antennæ elongate, porrect,

rising from a frontal prominence; basal joint or joints rather long; 3rd joint as long as 1st and 2nd together, with a conspicuously white terminal style. *Thorax* normally shaped, with dense though not very conspicuous pubescence without any bristly hairs. Scutellum large, resembling thorax in colour and pubescence, with a fairly conspicuous marginal fringe. *Abdomen* elliptic, as long as thorax and scutellum together; basal segment short, the others normal. Pubescence fairly abundant and equally distributed, always tawny except at tip. *Legs* rather strong, quite simple unless the tarsi are rather widened. *Wings* with the venation found in *Syrphus*; anterior cross-vein rather before middle of discal cell, rather upright; veins closing 1st and 2nd posterior cells rather angulated at the flexure.

The above description is abbreviated from that of Verrall*. This genus falls in the CHRYSOTOXINÆ, and differs from *Chrysotoxum* by the antennæ being stylate, as compared with the dorsal position of the arista in the latter genus.

Range. Europe, Mediterranean, Orient, N. America, Mexico.

Life-history apparently unknown. Females of *C. yerburyi*, Verrall, have been noticed in Scotland paying fleeting visits to pine-stumps.

Only two species have been recorded from British India. Both were described in a paper by the late G. H. Verrall which appeared posthumously (Trans. Ent. Soc. London, 1913, pp. 323–333). The descriptions are reprinted here without alteration.

232. Callicera doleschalli, *Verr.*

Callicera doleschalli, Verrall, Trans. Ent. Soc. Lond. p. 328 (1913).

"♂. *Head* wider than thorax, and seen in profile nearly two-thirds as long as deep; face shining black slightly obscured with brownish-grey dust and with rather abundant pale brownish-grey pubescence, hanging down or sloping rather inwards, leaving bare a broad shining black middle line all down the face; eye-margins broadly dusted brownish-grey, seen from above there is a line of dark pubescence running down the sides of the face from the base of the antennæ parallel with eye-margin; frontal prominence broad and rounded, all polished black; upper part of face under antennæ bulging; a rather broad black space across front part of jowls from eyes to mouth, jowls with long brownish-grey pale pubescence like that of face; lower half of back of head a little inflated and all the same brownish-grey colour as facial eye-margins but with only short brownish-yellow pubescence, upper half blackish, reduced in width and hollowed out towards vertex, with a brownish post-ocular ciliation on upper part ending in much longer hairs on vertex. Eyes with dense brown pubescence

* Brit. Flies, Syrphidæ, p. 655.

longest on front part of eye, shorter, rather sparser and paler below and behind, but no dark band visible. Antennæ with basal joint long, rather ferruginous; 2nd joint dark brown, about two-thirds the length of 1st; 3rd joint dark brown and nearly so long as first two together, about as thick as end of 2nd joint for half its length, then gradually tapering to a moderate point, arista not quite so long as 3rd joint, blackish and moderately thick on basal quarter, then not conspicuously white but slightly brownish-white and ending in a very sharp point, the basal antennal joint with unusually conspicuous bristly pubescence on end three-quarters above, and on end half beneath; 2nd joint with very minute, hardly noticeable pubescence. *Thorax* dark æneous, appearing darker behind because of black pubescence, on the disc may be traced with difficulty a broad middle blacker stripe and apparently four more broad lines, the two outer ones on each side connected in front just above the suture. Pubescence fairly dense but not very long except at sides and nearly erect on the disc, brownish-grey on all fore part but black on all hind part, becoming long and rather conspicuous on and about postalar calli. Scutellum moderately bright æneous, large, rather inflated and semicircular, pubescence round margin forming a long conspicuous whitish fringe, but on disc not quite so long and tinged with brown. *Abdomen* much spoilt by damp, pubescence on two basal segments long, pale brownish on 1st segment (almost whitish at sides, similar to that round margin of scutellum, but rusty on disc), black and conspicuous on all 2nd segment (but rusty on disc), erect, abundant and whitish-yellow on 3rd and 4th segments. I think the 1st segment is deep black, and that there is on the 2nd segment well after the æneous base a broad transverse deep black band which is extended down the middle to the hind margin. Belly æneous with rather abundant brownish-orange pubescence. *Legs* orange-red with nearly the basal half of femora indeterminately black, tarsi blackish after most of basal joint, the last three joints of tarsi appear to be a little dilated. Femora all with abundant greyish-white pubescence, but front pair with a few inconspicuous black hairs behind above. Front tibiæ behind on more than tip half with a conspicuous whitish fringe which occurs (though much less conspicuous) on middle tibiæ, hind tibiæ also with some inconspicuous short whitish pubescence about the middle. *Wings* rather tinged with brownish about the base and especially about the middle and on the stigma, discal cross-vein before one-quarter the length of discal cell, upper marginal cross-vein with a rounded angle. Alar squamæ blackish-brown with fringes of the same colour, thoracal squamæ more orange-brown with large conspicuous fringes of the same colour. Halteres orange.

"*Length* about 12 millim. without antennæ, which measure 2·75 mm.

"Described from a ♂ in the British Museum taken by Lt. E. Y. Watson in the North Chin Hills [Burma], 5000 ft., in March 1893."

233. Callicera sackeni, *Verr.*

Callicera sackeni, Verrall, Trans. Ent. Soc. Lond. p. 331 (1913).

"♂ *Head* dilated and nearly two-thirds as long as broad, pubescence of face greyish-orange and hardly leaving a bare middle line but bare only just about middle of facial knob, a good deal of yellow dust along upper sides of face, pubescence similar to the facial is present all round under eyes and up lower part of back of head, which is very little inflated; jowls æneous. Eyes densely clothed with pubescence, and I think I can trace a dark line of pubescence down eyes in the usual place. Frons shining black, almost or quite bare. Antennæ without style not so long as head, both the basal segments short and 3rd segment quite three times as long as the other two together, considerably dilated on the basal half and ferruginous beneath at the base, but tapering on the end half; style long, white and thin, but blackish and thickened at base, almost half as long as 3rd joint. *Thorax* with brownish-orange dense pubescence, but more than hind half of disc with mainly black pubescence intermixed, and scutellum on disc with practically all rather conspicuous black pubescence, though beneath and round margin the pubescence is longer and all brownish-orange. Pleuræ with brownish-orange pubescence. *Abdomen* bright æneous, though I can trace nearly all the 2nd segment dull black and a broad dull black band right across the disc of 3rd segment, it is on this latter segment that the bright æneous colour is most conspicuous on the fore and hind margins, broader at the sides than at middle; the 4th segment appears coppery æneous. Pubescence equal and dense, of a more ruddy hue than on thorax, with no trace of black hairs at tip. Belly with dense brownish-orange pubescence. Genitalia black. *Legs* rufous orange, femora black except on the tip quarter when they become indeterminately rufous-orange, tarsi rather darkened above on the last two or three joints. Pubescence behind anterior, and in front of hind, femora, dense, not very long, brownish-orange; hind tibiæ rather darkened above for a considerable space after the middle; coxæ, trochanters and base of femora conspicuously black haired, especially the coxæ and trochanters. *Wings* rather brownish about base and fore part just past discal cross-vein and more so about costa to end of long subcostal vein, discal cross-vein at two-fifths of discal cell, upper marginal cross-vein a little angulated. Squamæ dark brownish glassy, fringes of thoracal squamæ long, brownish-orange. Halteres with small blackish-brown knobs.

"*Length* without antennæ 13 millim. Antennæ 3·5 mm.

"Described from one ♂ in the British Museum from Burma (Fort White, North Chin Hills, 7000 ft., April 1893) collected by Lt. E. Y. Watson."

Subfamily MICRODONTINÆ.

Antennæ porrect, elongate, 1st joint long, cylindrical, arista dorsal, bare, sub-basal; eyes bare (at least in *Microdon*), wide apart in both sexes, frons a little wider in ♀ ; face flat and broad. *Wings* comparatively short, especially in *Microdon*; 3rd vein (in *Microdon*) emitting the stump of a vein across middle of 1st posterior cell; 4th vein strongly recurrent, closing 1st posterior cell some distance from wing-border; 5th vein bent upwards at about a right angle, apical portion generally nearly straight (*Microdon*); anterior cross-vein some distance before middle of discal cell. *Legs* generally stout, tarsi generally dilated.

The above characters are drawn up mainly from *Microdon*, the principal genus. *Mixogaster* is confined to the New World, with the exception of one species from Australia: my *vespiformis* was wrongly placed in this genus, and a new genus, *Paramixogaster*, is defined below, to contain this species. Besides these, only two other genera of the subfamily are known, and they are recorded only from South America and Australia.

The genus *Microdon* constitutes the greater part of this subfamily. Some of its species have a remarkable resemblance to bees of the genus *Apis*, though the larvæ of those species of which the life-history is known live in ants' nests. More typical species of *Microdon* are broader and more robust, brilliantly coloured, and often metallic.

The two Oriental genera may be distinguished as follows:—

First joint of antennæ as long as (generally longer than) 3rd; 2nd rather short but always obvious, sometimes nearly half as long as 3rd; the closed 1st posterior cell nearly always with a spur on front margin.	MICRODON, Meig., p. 307.
First joint of antennæ elongate, cylindrical, but shorter than in *Microdon*; 2nd so minute as to be easily overlooked; 3rd much longer than 1st (5 to 6 times as long in the type-species).	PARAMIXOGASTER, [gen. n., p. 319.

Genus **MICRODON**, *Meig.**

Microdon, Meigen, Illig. Mag. ii, p. 275 (1803).
Anhritis, Latreille, Hist. Nat. Crust. Ins. xiv, p. 358 (1804).
Chymophila, Macquart, Hist. Nat. Ins., Dipt. i, p. 485 (1834).
Dimeraspis, Newman, Ent. Mag. v, p. 372 (1838).
Mesophila, Walker, List Dipt. Brit. Mus. iv, p. 1157 (1849).
Ubristes, Walker, Ins. Saund., Dipt. i, p. 217 (1852).
Omegasyrphus, Giglio-Tos, Boll. Mus. Zool. e Anat. comp. Torino, vi, no. 108, p. 4 (1891).

GENOTYPE, *Musca mutabilis*, L., by original designation.

* For a list of the Oriental species, see Brunetti, Rec. Ind. Mus. ii, p. 94 (1908): also de Meijere, Tijd. v. Ent. li, pp. 199, 200, notes and a table of 14 species (1908).

Head about as broad as thorax, somewhat flattened; eyes bare, wide apart in ♂, still more so in ♀; frons in ♂ generally slightly narrowed about the middle; face rounded, very pubescent, mouth-border not prominent; antennæ porrect, approximate at base, 1st joint the longest, cylindrical, 2nd about one-fourth as long as the 1st, broader at tip and longer on lower side, 3rd joint of irregular shape, longer than 2nd, but usually only as long as, or shorter than, 1st, upper side nearly flat, lower side gently rounded; arista sub-basal, bare, somewhat thickened. *Thorax* subquadrate, arched, with rather dense pubescence; scutellum rather large, in many species with two blunt tubercles or spines near the tip. *Abdomen* about as long as thorax, rounded, well arched and curved downward; 4th segment in ♂ nearly half the length of the abdomen, in ♀ 4th and 5th segments subequal, 5th segment in ♂ often very small, twisted sideways to the left so that the bulbous base

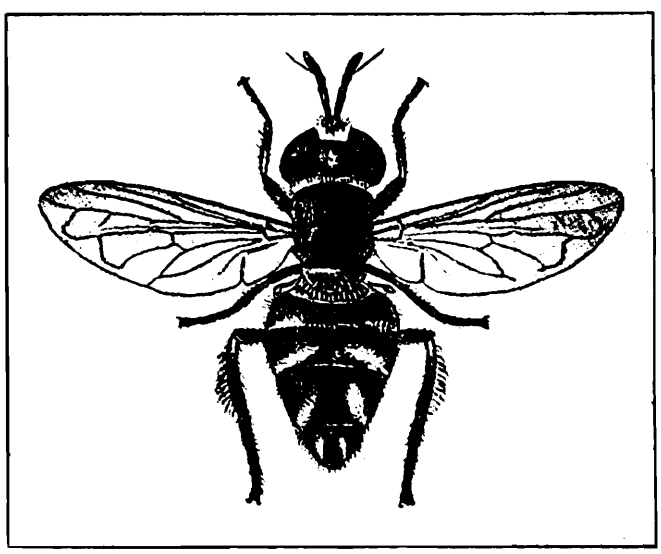

Fig. 65.—*Microdon bellus*, sp. nov., ♀.

of the large genitalia is prominent, with appendages concealed beneath the body. *Legs* short and thick, tarsi wide. *Wings* comparatively short, venation recalling that of *Eumerus*, marginal cell widely open; 3rd vein sinuous, with a stump of a vein projecting backwards nearly half-way across 1st posterior cell; latter closed a long distance from border of wing by the strongly recurrent tip of the 4th vein; anterior cross-vein distinctly before middle of discal cell; apical portion of 5th vein rectangular, nearly upright; anal vein slightly but distinctly curved at tip; squamæ large.

Range. Europe, North and South Africa, Orient, Tasmania, North and South America.

Life-history. That of *M. mutabilis*, L., and of certain other European species is known. The larvæ are so unlike those of any other insects that when first discovered they were actually described as molluscs by two authors, writing independently, in two consecutive years, and several years elapsed before Schlotthauber cleared up the mystery, the matter being more

completely discussed by Elditt in 1845*. The curious larvæ are short-oval, very convex above, flat below, with the margin incised to receive the head in front, and with a posterior spiracular process. They live in ants' nests. The larvæ of *M. eggeri* have been found frequently in nests of certain species of *Formica* in stumps of coniferous trees, those of *M. mutabilis* in nests of certain other species of *Formica*, usually under stones. Certain non-European species have been discovered in nests of other ants. Their exact relationship with the ants does not yet appear to be certain. It has been suggested that they feed on the pellets of food disgorged from the ants' mouths. The literature is summarised by Lundbeck, Diptera Danica, v, pp. 579–581 (1916).

This well-marked genus forms a rather isolated group, its nearest ally being, perhaps, *Ceria*.

Table of Species.

1.	2nd abdominal segment distinctly but not greatly contracted in middle, making the abdomen appear subclavate; (vertex well developed, scutellum small, rounded) .	2.
	2nd abdominal segment never contracted; abdomen short and rounded or elongate-conical, never subclavate	3.
2.	Legs orange; wings quite clear; 4th vein recurrent at a right angle . . .	*contractus*, sp. n., p. 310.
	Femora considerably black; wings with microscopic obvious pubescence; 4th vein recurrent at an acute angle . .	*conveniens*, sp. n., p. 311.
3.	Scutellum with hind corners produced into an obvious blunt point or tooth. . .	4.
	Scutellum oblong or rounded, not produced into teeth	9.
4.	Brilliantly metallic species.	5.
	Non-metallic species	6.
5.	Abdomen without white hair-spots	*stilboides*, Walk., p. 311.
	Abdomen with white hair-spots.	*metallicus*, de Meij., [p. 312.
6.	Small species, 5 mm. long	*cæruleus*, Brun., p. 313.
	Larger species, 10 to 13 mm. . .	7. [p. 313.
7.	Abdomen much broader than thorax .	*fulvopubescens*, sp. n.,
	Abdomen not broader than thorax	8. [p. 314.
8.	Wholly black species .	*carbonarius*, sp. n.,
	Not wholly black species	*apiformis*, sp. n., p. 314.
9.	Metallic species .	*bellus*, sp. n., p. 315.
	Non-metallic species	10. [p. 316.
10.	Surface of wing with microscopic scales	*squamipennis*, sp. n.,
	Surface of wing without trace of scales. . .	11.
11.	Abdomen in considerable part red.	12.
	Abdomen with no part red.	13.

* Stett. ent. Zeit. vi, p. 384, pl. i, figs. 6–14 (1845).

12. (*a*) Legs wholly black; antennæ black; head black; length 9½–11 mm. ... *annandalei*, Brun., [p. 316.
(*b*) Legs (except hind femora) mainly orange; antennæ orange; head ferruginous-red; length 14 mm. . . *ruficaudus*, Brun., [p. 317.
(*c*) Legs wholly orange; antennæ brown; head blackish; length 7½ mm. *flavipes*, Brun., p. 317.
13. Thorax dark shining violet. . *unicolor*, Brun., p. 318.
Thorax black *auricinctus*, Brun., [p. 318.

The species of *Microdon* are in some cases closely allied, and as many specimens go greasy after a year or two unless quite thoroughly dried soon after capture, it is difficult to identify these with certainty. The blunt points or teeth at the hind corners of the scutellum are easily overlooked.

234. **Microdon contractus**, sp. nov.

♀ *Head* slightly but distinctly broader than thorax; vertex only slightly raised above level of eyes; latter rather dark orange-brown with irregular black markings. Frons and face with parallel sides, at level of antennæ forming nearly half width of head, former with dense yellowish-grey pubescence, latter with similar whitish pubescence, face gently curved, moderately produced. Antennæ dark brown, 1st joint cylindrical, rather paler; 2nd about one-third as long as 1st, broader at tip; 3rd about 1⅓ times as long as 1st, much stouter, arista orange-brown. Occiput with a slight deep blue tinge, prominent behind vertex, dying away at upper corners of eyes; upper margin with short brownish-grey hairs; sides and lower part with whitish pubescence. *Thorax* black, finely punctate, with greyish-white, rather ragged pubescence, which is a little more conspicuous along suture and much longer on pleuræ and in front of wing-base; humeri and hind corners a little brownish-orange. Scutellum small, hind margin rounded, with grey hairs; metanotum shining dark brown, bare. *Abdomen* finely punctate, dark brown, with a dull violet tinge; hind margin of 1st segment bare, very shining; 2nd segment about twice as long as 1st, distinctly though not greatly narrowed at middle, basal half pale yellowish, bare, with a distinct rounded bump in middle of anterior half. Pubescence of dark part of abdomen black; at base of 2nd, 3rd and 4th segments a rather broad band of greyish pubescence, which is invisible in certain lights. *Venter* with whitish pubescence. *Legs* orange, knees and about basal half of tibiæ pale lemon; pubescence on coxæ whitish, obvious, elsewhere on legs inconspicuous. *Wings* quite clear; apical section of 4th vein turned up at a right angle and just slightly recurrent at extreme tip, a minute appendix at flexure; 5th vein well rounded at flexure and very recurrent. Squamæ whitish; halteres orange-yellow.

Length, 9 mm.

Described from a unique ♀ from Deesa (Bombay Presidency), iii. 1897 (*Nurse*).

Type in British Museum.

235. **Microdon conveniens**, sp. nov.

♀ Very near *contractus* but certainly distinct. Vertex more elevated, 1st joint of antennæ blackish-brown (rest of antennæ missing); eyes dark coffee-brown. *Legs* orange, basal half of middle femora brownish, a narrow median brown ring on middle tibiæ; hind femora black for three-fourths of their length, hind tibiæ with a narrow black ring; traces of a dark ring on fore tibiæ. *Wings* with the ultimate microscopic pubescence sufficiently obvious just to darken the surface when seen under a strong lens. 4th vein with apical section straight and recurrent at an acute angle.

Length, 9 mm.

Described from a single ♀ from Assam, in the British Museum.

236. **Microdon stilboides**, *Walk.*

Microdon stilboides, Walker, List Dipt. Brit. Mus. iii, p. 538 (1849).

♂ *Head* metallic blue-green. Eyes separated at nearest point of approach by one-fifth of the head; vertex and frons with blackish-brown pubescence, face with whitish pubescence, in both cases moderately dense. Antennæ black, set in a bare brown spot on face, arista brown. Occiput concolorous metallic, with a fringe of short pale yellow hairs. *Thorax* metallic blue-green, with dense pubescence, which appears black, green or yellow according to direction of view; pleuræ with black pubescence. Scutellum with hind corners produced into two blunt teeth. *Abdomen* metallic blue-green; 1st segment wholly purple; extreme tip of abdomen for a small space orange; pubescence black, almost microscopic, a litte pale yellowish hair towards tip. Venter purple at base, remainder missing; genitalia orange. *Legs* metallic purple; femora with blue-green reflections; pubescence of legs pale, inconspicuous. *Wings* pale brownish-grey; darker anteriorly to behind 3rd longitudinal vein; spurious vein very distinct, ending opposite tip of appendix in 1st posterior cell; a short appendix towards tip of 4th vein, apical section of latter sinuate. Alar squamæ pale brown, with brown edges and fringe; thoracic squamæ greyish-white with whitish fringe; halteres whitish.

Length, 12 mm.

Described from Walker's *type*, a ♂ labelled simply "E. Ind.," which usually means East India: in the British Museum. A brilliantly metallic, almost uniformly green species with bluish reflections, and punctate.

? ♀. *Head*: frons and face with parallel sides, former slightly narrower than latter, which is one-third of head, both blue-green with a narrow transverse purple line above antennæ; eyes, antennæ and occiput black; head with short brownish-grey pubescence. *Thorax* blue-green, with violet or purple reflections and short black pubescence: scutellum oblong, concolorous, the hind corners produced as two short blunt teeth. *Abdomen* coppery, with very short depressed yellow pubescence; 1st segment deep blue, with whitish pubescence; venter bright blue, hinder part bright green; ovipositor long, narrow, yellowish-brown. *Legs* blue-green, with stiff black pubescence and softer whitish pubescence on some parts; pulvilli orange-brown. *Wings* brownish as far back as 3rd vein, remainder grey; halteres pale orange.

Length, 13 mm.

Described from a perfect ♀ from Peshoke Spur, Darjiling District (*Lister*), in the Indian Museum; and a second damaged ♀ in the British Museum from Sikkim (*F. C. Möller*). A brilliantly metallic, punctate species.

There seems every probability of the above being the ♀ of *stilboides*, in spite of the conspicuous difference of its coloration from that of the ♂; metallic species are prone to this variation. It is a magnificent species, and the only one with an appendix towards the tip of the 4th longitudinal vein included in this volume. Dr. de Meijere recorded a ♂ from Java.

237 Microdon metallicus, *de Meij.*

Microdon metallicus, de Meijere, Bijd. Dierk. xviii, p. 98 (1904).

♂ Shining steel-blue; upper side of thorax more violet; upper side of body densely punctate. Antennæ dull black, 1st joint as long as 2nd and 3rd together, 2nd only a quarter as long as 3rd. Epistome with dense whitish pubescence. Eyes blackish-brown, facets of uniform size. *Thorax* above with short black pubescence; scutellum with lighter pubescence, its hind corners produced into two blunt teeth; spines with white pubescence. Sides of thorax nearly bare. *Abdomen* with very short dark pubescence; anterior margins of segments towards sides with white hair-spots; furthermore, the 3rd and 4th segments have two similar spots near the hind margin, those on the 4th segment larger. Two transverse impressions are found respectively between 3rd and 4th segments, and distinctly before tip of 4th segment. *Legs* black; tibiæ on outer side with dense short white pubescence. *Wings* clear.

Length, 11 mm.; of wing, 9 mm.

Described by de Meijere, from Bengal, and stated to be near *stilboides*, Walk.; it differs from that species, *inter alia*, by having white hair-spots on the abdomen.

238. **Microdon cæruleus**, *Brun.*

Microdon cæruleus, Brunetti, Rec. Ind. Mus. ii, p. 92 (1908).

♀. Frons nearly one-third width of head, shining blue-black with very sparse and short yellowish hair; vertex forming a slightly raised triangle reaching almost to the base of the antennæ, which are blackish-brown, with 3rd joint a little flattened, three or four times as long as 2nd, and with 1st much shorter than 3rd; mouth-border pale. *Thorax* (much broken) violet-black; scutellum concolorous, with two short blunt but distinct spines. *Abdomen* deep violet-black, posterior

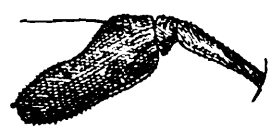

Fig. 66.—*Microdon cæruleus*, Brun., left antenna in profile *.

borders of segments and tip of abdomen with whitish hair. *Legs* bright tawny-red, base of fore femora brown, middle femora and tibiæ brownish-grey, base of hind femora and apical half of posterior tibiæ, brown. *Wings* pale grey, recurrent portions of 4th and 5th longitudinal veins almost straight.

Length, 5 mm.

Described from one ♀ from Margherita, Assam, in the Indian Museum (the only specimen which I can now definitely refer to this species).

239. **Microdon fulvopubescens**, sp. nov.

♀ *Head*: frons and face with almost parallel sides, at level of antennæ more than one-third of head, finely punctate, with black pubescence above antennæ and yellowish-grey pubescence on the somewhat æneous face. Eyes dull red; antennæ black, 3rd joint nearly twice as long as 2nd, arista brownish. Occiput black, a little yellow pubescence on lower half. *Thorax* black, with a distinct æneous tinge and dense deep orange pubescence. Pleuræ and scutellum similar; scutellum with two blunt teeth. *Abdomen* much broader than thorax, black, with an æneous tinge on greater part of surface, and dense, rather depressed, orange pubescence. Venter shining black, minutely punctate. *Legs*: coxæ and femora black; tibiæ and tarsi dark brown; a little yellowish-grey hair on coxæ and close black pubescence on femora. Tibiæ mainly with short black pubescence, but it is yellowish-grey on front side of fore pair, outer side of middle pair, and both outer and hinder sides of hind pair. Tarsi with blackish-brown pubescence, hind tarsi with orange pubescence on under side. *Wings* pale grey,

* Fig. 66 was drawn from a ♂ example, which, after further examination, I think may not be conspecific with the ♀. In the latter the 3rd antennal joint is nearly three times as long as the 2nd on the inner side and about four times as long on the outer side.

veins hardly perceptibly and narrowly suffused with pale brown; apical section of 4th vein considerably recurrent, nearly straight. Thoracic squamæ orange with dark orange margin and fringe; halteres brownish-orange, clubs blackish.

Length, 13 mm.

Described from a single ♀ from Ceylon, in the British Museum.

240. **Microdon carbonarius**, sp. nov.

♂ ♀ *Head*: in ♂, frons slightly narrowed in middle, at which part it is less than one-third of the head; face broader than frons, widening a little below; both frons and face shining black, finely punctate with black pubescence. Eye-facets of equal size. Antennæ black, 3rd joint two and a half times as long as 2nd and as long as 1st. Occiput black, with a little black pubescence towards margin on lower part and behind vertex. In ♀, frons and face equally wide, with parallel sides; distinctly wider than narrowest part of frons in ♂. *Thorax* shining black, finely punctate, bearing short black pubescence; scutellum similar, with two apical distinct spines at tip; sides of thorax shining black with black pubescence. *Abdomen* in ♂ oblong, narrower behind, in ♀ gradually narrowing from base of 3rd segment; shining black, finely punctate; 5th segment turned quite sideways to the left; the large globular base of the genitalia conspicuous, brownish-grey, with brownish-orange appendages. ♀ genitalia apparently normal. Venter black with black pubescence. *Legs* moderately shining black, pubescent; knees brownish-orange; tarsi with some yellow or brownish-orange pubescence; pulvilli orange. *Wings* pale grey; veins very distinct; halteres orange; squamæ dirty white.

Length, 10 mm.

Described from two ♂ ♂ and three ♀ ♀ in the Indian Museum from above Tura, Garo Hills, Assam, 3500–3900 ft., 15. vii–30. viii. 1917, including *type* ♂; ix. 1917, *type* ♀ (*Kemp*). This species bears a considerable resemblance to my *unicolor*, but the scutellar spines will immediately distinguish it. *Type* ♂ in the Indian Museum.

241. **Microdon apiformis**, sp. nov.

♂ *Head*: frons a little narrower in middle, at that point much less than one-third of the head; face a little wider than frons, gradually widening to lowest part; frons and face moderately shining black with rather long bright chrome-yellow pubescence, both finely punctate. Antennal prominence very small, shining black, 1st and 2nd joints dark brown, 3rd black, two-and-a-half times as long as 2nd and about as long as 1st, tip obtuse. Occiput black, a little pale hair on lower part and behind vertex, middle margin nearly bare. *Thorax* blackish, moderately shining, finely punctate; side and hind margins, humeri and scutellum, rather translucent pale yellowish-brown; whole surface with short, close bright yellow pubescence. Scutellum with two distinct apical, brownish-orange, short, obtuse spines. *Abdomen* finely punctate;

1st and 2nd segments almost anastomosed; 4th segment nearly as long as 2nd and 3rd together; whole dorsum yellowish-brown, but 3rd more or less blackish towards sides and 4th wholly blackish except in upper central part. Pubescence of abdomen following ground-colour; the yellow being longer, the black very short and dense. Hind part of 4th segment towards sides with a little yellowish pubescence; 5th segment twisted to the left side; globular base of genitalia blackish, large, with yellowish-grey tomentum. Venter yellowish-brown with a little moderately long, bright yellow hair. *Legs*: coxæ shining black with bright yellow pubescence; femora shining black, with sparse pale pubescence; a small orange space below at base; tips orange. Anterior tibiæ on front side of fore pair and outer side of middle pair mainly blackish; hind tibiæ entirely black. All tibiæ with thicker yellow pubescence than femora. Tarsi brown with yellow pubescence, hind pair darker on upper side with orange-brown pubescence below. *Wings* pale grey, the microscopic surface bristles very minute and slightly depressed; a barely perceptible trace of suffusion over outer sides of 1st posterior and discal cells and tips of 3rd and 5th veins. Halteres yellow; squamæ dirty white.

Length, 11½ mm.

Described from two ♂ ♂ in the Indian Museum from above Tura, Garo Hills, Assam, 3500–3900 ft., 15. vii–30. viii. 1917 (*Kemp*). This species, as its name implies, has a considerable resemblance to the honey-bee, *Apis mellifica*, L., and its allies.

242. **Microdon bellus**, sp. nov. (Text-fig. 65, p. 308.)

♀ *Head*: frons at vertex one-fourth the width of the head, brilliantly shining metallic peacock-blue. Face barely broader than frons; brilliantly shining metallic-green; frons and face microscopically punctate, both with very pale yellowish-grey, dense, moderately long pubescence. Antennæ black, 3rd joint two-and-a-half to three times as long as 2nd and distinctly shorter than 1st. Occiput metallic blue-black with rather dense whitish pubescence. *Thorax* brilliantly shining metallic dark blue, minutely punctate, with dense yellowish-grey pubescence. Scutellum unspined; shining metallic blue-green, minutely punctate with yellowish-grey pubescence. Pleuræ shining blue with whitish pubescence, rather long on mesopleura, pteropleura and sternopleura. *Abdomen* brilliantly shining metallic dark blue, very closely punctate. Anterior corners and sides of 1st segment with soft, silvery-white pubescence; 2nd segment with similar pubescence on hind margin towards sides, 3rd segment similar, but the inner ends of the stripes turned upwards and slightly dilated; 4th segment with a curved stripe on each side of middle line, placed diagonally from a little above centre towards hind corners, and 5th segment with a vertical stripe on each side of middle line; all the stripes composed of silvery-white pubescence. Sides of abdomen with similar pubescence. Venter shining dark blue, hind margins of 2nd and 3rd segments somewhat whitish, with silvery-white pubescence. *Legs* shining blue-black with conspicuous

white pubescence; anterior knees narrowly, and basal half of all tibiæ, yellowish; anterior tarsi darker brown towards tips. *Wings* rather pale brown; halteres yellowish.

Length, 8–9 mm.

Described from two ♀ ♀ in the Pusa collection from Mussoorie, ix. and x. 1906. *Type* sent to the British Museum.

? ♂. A headless specimen pinned on the same piece of cork as one of the females may be the ♂, though the genitalia are not visible. The whole thorax and scutellum are brilliantly cupreous, the pleuræ shining green, all covered with dense bright orange pubescence. The abdomen is duller cupreous with metallic reflections. Hair-spots as in ♀, but golden-yellow instead of white, except on 1st segment. Legs with bright yellow pubescence, especially long and conspicuous on tibiæ. In all else as in ♀ Mussoorie, ix. 1906.

243. **Microdon squamipennis**, sp. nov.

♀. Very like *M. flavipes*. Differing by the antennal prominence, the 1st antennal joint, vertex and eyes all being shining black. *Abdomen* black. Basal half of anterior femora black, the colour more or less continued on upper side towards tip; hind femora black except at extreme tip; apical half of anterior tibiæ relatively darker than in *flavipes*; hind tibiæ and all tarsi quite black. *Wings* pale grey; all the veins rather broadly suffused with pale blackish. The whole surface of the wing with microscopic dirty-grey scales.

Length, 8 mm.

Described from a single ♀ in the Indian Museum from Tura, Garo Hills, Assam, 1200–1500 ft., 15. vi–15. vii. 1917 (*Kemp*). This species is unique amongst Oriental forms in having the wings scaly, yet its close resemblance to *flavipes* is remarkable.

244. **Microdon annandalei**, *Brun.* (Pl. VI, fig. 7.)

Microdon annandalei, Brunetti, Rec. Ind. Mus. ii, p. 91 (1908); i, pl. xiii, fig. 10, full insect (1907).

♂ ♀ *Head* black; frons narrowed just above antennæ, covered with close silvery-white hair, which is only visible from above; vertex black; antennæ black; 3rd joint one-and-a-half times as long as 2nd, or as long as 1st and 2nd together. Under side of head black, eyes bare, very shining and smooth. In ♀, frons and face with nearly parallel sides, one-third width of head, both black with a little short whitish pubescence. *Thorax* black, with very sparse gold-grey hair towards the posterior part, seen best from behind; scutellum similar, with a slight indentation in centre of posterior border. *Abdomen* and venter uniformly brick-red, with traces of minute whitish pubescence on posterior half; base of 1st segment black. *Legs* black, with fine silvery-white hair on coxæ and outside of tibiæ. *Wings* pale blackish; darker anteriorly.

Length, 9½–11 mm.

Described originally from one ♂, the *type*, in the Indian Museum collection, from Soondrijal, Nepal. Bhowali, 2. vii. 1912 (*Imms*); Pusa, 18. ix. 1908; Chapra, Bengal; Simla, 1898 (*Nurse*); Khasi Hills, Assam.

245. **Microdon ruficaudus**, *Brun.*

Microdon ruficaudus, Brunetti, Rec. Ind. Mus. ii, p. 93 (1908).

♀. *Head* above and below antennæ entirely ferruginous-red, with short tawny hair; frons one-fourth the width of head; ocelli very close together; antennæ tawny-red, 3rd joint brownish-black. Eyes bare, shining, facets very small. *Thorax* blackish, with fiery red-ferruginous hair; scutellum similar. *Abdomen* obconical, distinctly longer than thorax; basal half black; apical half tawny-red with short golden-red hair. Venter bare, basal half black, apical half red. *Legs* ferruginous-red, practically bare; coxæ, a streak at base below middle femora, hind femora wholly except tip, and a spot at outer side of hind tibiæ at tip, black. *Wings* tawny-yellow. Halteres tawny.

Length, 14 mm.

Described from the one ♀ taken by me in Calcutta, 26. ix. 1904. *Type* in my collection. Sack has recently recorded this species from Formosa.

246. **Microdon flavipes**, *Brun.*

Microdon flavipes, Brunetti, Rec. Ind. Mus. ii, p. 92 (1908).

♂ ♀ Frons and vertex blackish, the former in ♂ one-fourth, in ♀ one-third width of head at vertex, with dense gold-yellow hair, only visible from above; eyes bare, shining, bright brown, antennæ and antennal stem brown, 3rd joint two to three times as long as 2nd; 1st as long as 2nd and 3rd together. *Thorax* brown, dorsum black, with gold hair; scutellum black, with gold hair.

Fig. 67.—*Microdon flavipes*, Brun., left antenna in profile *.

Abdomen orange to brown with gold pubescence, which is very minute on 1st three segments, seen only from in front, and forming a gold spot extending over the edges at the sides of the 3rd and 4th segments. Two broad gold hair-spots sometimes meet towards the apex of the abdomen, in the form of a V *Legs* entirely bright tawny, with minute silver-yellow pubescence

* In fig. 67 the 2nd joint is a little too short in proportion to the 3rd.

on outer side of tibiæ and tarsi. *Wings* quite clear, 4th longitudinal vein quite straight on the recurrent portion.

Length, 7½ mm.

Described from four ♀ ♀ (including *type*) from Mergui, Lower Burma, and one ♂ and one ♀ from Tura, Garo Hills, Assam, 1400 feet, x. 1917 (*Mrs. Kemp*); all in the Indian Museum collection.

247 **Microdon unicolor**, *Brun.*

Microdon unicolor, Brunetti, Rec. Ind. Mus. xi, p. 225 (1915).

♂ *Head* dark violet, a dark bluish tint behind upper part of eyes; frons and face with rather long yellowish-grey hair, leaving the centre of the latter bare; the hair is also sparser on the vertex and round the ocelli. A few stiff black hairs behind vertex. Middle and lower parts of ocular orbits with short yellowish-grey hair. Proboscis brown. Antennæ with 1st joint distinctly longer than 3rd, nearly as long as 2nd and 3rd together; 3rd three times as long as 2nd, 1st and 2nd joints black, 3rd black with dirty brownish-grey dust. *Thorax* and scutellum deep violet, only a little shining, with rather thick, short, black pubescence, which also occurs on the pleura; mesopleura with a little short grey hair. *Abdomen* deep violet, a little shining; dorsum with very short black pubescence; longer, wholly grey pubescence at sides, also sparsely on hind margins of segments. Venter deep violet, nearly bare. *Legs* blackish-violet with minute black pubescence; tibiæ with grey pubescence except on inner sides; tarsi with a little grey pubescence above, with which at least on hind metatarsi some black pubescence at the sides is intermixed. *Wings* rather dark brown, a little paler on posterior half; halteres brownish-yellow.

Length, 10–11 mm.

Described from a perfect ♂ from near Puri, Orissa, 6. xi. 1912 (*Gravely*). In the Indian Museum.

The other only violet-black species from the East is *sumatranus*, Wulp, which is marked freely on the body and legs with white hair-spots.

248. **Microdon auricinctus**, *Brun.*

Microdon auricinctus, Brunetti, Rec. Ind. Mus. ii, p. 93 (1908).

♀. This species bears considerable resemblance to my *ruficaudus*, but differs as follows:—The antennæ are black, except the dark red basal half of the 1st joint. The hair on the face is thick, golden-yellow. Metanotum shining black. The 2nd abdominal segment is black in the centre, and ferruginous-red towards the sides; nearly the whole segment, including the posterior border, being covered with short, fiery, golden-reddish, tomentose hair. 3rd segment black; a stripe of short bright golden hair across the base, continued downwards over the edge, and along the sides, below. A stripe also of similar hair on the posterior border, also

carried over the edge to the under side. 4th segment wholly ferruginous-red, nearly bare, except for a little concolorous hair at tip. *Legs* with fore coxæ tawny, posterior coxæ blackish, all coxæ with bright short golden-yellow hair. Remainder of legs wholly bright tawny-red, unmarked. *Wings* dark grey, distinctly blackish at tip and bright yellowish-tawny from the anterior border down to the *vena spuria*, this colour extending distally to a little beyond the end of the upper basal cell.

Length, 13 mm.

Described originally from a perfect unique example (*type*) in my collection, sent to me by Mr. E. E. Green, taken at Kandy in October 1907. I have also seen specimens from Pashoke, Darjiling District (*R. S. Lister*); Talewadi, N. Kanara District, 3–10. x. 1916 (*Kemp*). Sack has recently recorded this species from Formosa.

Genus **PARAMIXOGASTER**, gen. nov.

GENOTYPE, *Mixogaster vespiformis*, Brun.

♂ *Head* nearly hemispherical, as broad as thorax; eyes bare, widely separated, frons forming half the width of the head, with parallel sides, well elevated; a transverse impressed line extends on each side from the upper corner of the eye down to the base of the antenna; face as broad as frons, with parallel sides and with a not very distinct impressed transverse line below antennæ. Antennæ contiguous at base, approximately cylindrical; 1st joint moderately long, 2nd so minute as to be easily overlooked, 3rd nearly six times as long as 1st, slightly sinuate, gradually increasing in size nearly to the rather blunt tip, arista bare, sub-basal. *Thorax* short, rather broader than long, barely arched, quadrangular with rounded hind corners; scutellum rather small, unarmed. *Abdomen* nearly twice as long as thorax and scutellum together, distinctly compressed to less than half its greatest width in the region of the 1st segment and basal half of the 2nd segment; 1st segment rather short, 2nd the longest, remainder of abdomen forming a short club. Genitalia mainly concealed. *Legs* moderately long and strong, simple. *Wings* of normal size; marginal cell widely open; 3rd vein nearly straight, with a spur at middle of anterior margin of 1st posterior cell; anterior cross-vein before first third of discal cell; apical section of 4th vein recurrent, with a small appendix at flexure; 5th vein almost recurrent, rounded at flexure.

Range. The only known species is recorded from Assam.

Life-history unknown.

On my examining species of Macquart's genus *Mixogaster* in the British Museum from various regions, it became apparent that my *vespiformis* is not congeneric; the differences lie in the structure of the antennæ and in the venation. In the various species (named and unnamed) of *Mixogaster* in the British Museum, the 1st posterior cell often has on its hinder side a

spur, which is frequently joined to the tip of the spurious vein; this spur is wanting in some species, but when present it is never situated on the anterior margin of the cell, as is normally the case in *Microdon*.

249. **Paramixogaster vespiformis**, *Brun.*

Mixogaster vespiformis, Brunetti, Rec. Ind. Mus. viii, p. 169, pl. vi, figs. 8–10, wing, head, abdomen (1913).

♂ *Head*: frons about half as wide as the head, with parallel sides, black, closely wrinkled; the dull-red eyes are bare, and, seen in profile, do not attain either the upper or lower limits of the head. Face with short, bright yellow hair; a narrow reddish-brown stripe extends across the frons, from eye to eye, immediately above the antennæ. The vertex is gently curved, the

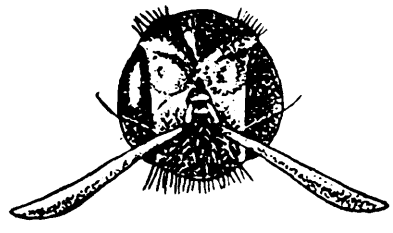

Fig. 68.—*Paramixogaster vespiformis*, Brun., head in front view.

whole of the face quite flat. Antennæ reddish-brown, absolutely bare; 1st joint moderately long, elongate, 2nd very short (easily overlooked), 3rd nearly six times as long as the 1st, elongate, slender, subcylindrical, very slightly thickened beyond the middle,

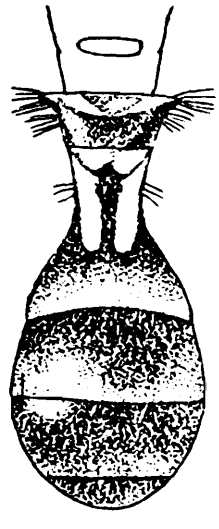

Fig. 69.—*Paramixogaster vespiformis*, Brun., abdomen.

and tapering to a blunt point; the whole antenna is as long as the distance from the frons to the tip of the scutellum; arista bare, comparatively small, curved, placed near the base of the 3rd joint; this latter joint is bent backwards across the eyes as are the antennæ in the Aculeate Hymenoptera. Back of head

blackish, a little bright yellow hair behind the eyes. *Thorax* bright red, with a median black stripe about one-third the width of the dorsum. Sides blackish, with a stripe of bright yellow hair reaching from the end of the transverse suture nearly to the legs; posterior margins of the dorsum with yellow hair. Scutellum black, covered with bright yellow hair. *Abdomen*: 1st segment narrowed immediately behind its base, black, its posterior border reddish-brown; 2nd segment at base of same width as the tip of the 1st, but from its middle rapidly widening; 3rd segment widening still further, the greatest width of the abdomen being at the junction of the 3rd and 4th segments, after which the abdomen rapidly narrows. The 2nd segment is black on the basal half, with a peculiar dirty milk-white stripe on each side of the median line; apical half of segment reddish-brown, with a fringe of short bright yellow hairs on posterior margin. 3rd and 4th segments mainly blackish with very short bright yellow hairs; sides of the former distinctly but not conspicuously reddish-brown; tip of abdomen similarly coloured. Venter blackish, whitish at base; genitalia orange. *Legs*: the coxæ are black; remainder of anterior legs brownish-yellow, the tibiæ with some whitish reflections.

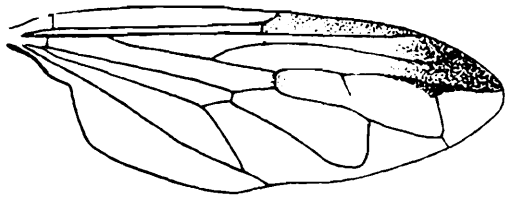

Fig. 70.—*Paramixogaster vespiformis*, Brun., wing.

Hind legs black, knees brownish-yellow, and tips of tarsi yellowish; the tibiæ and tarsi with minute white pubescence; under side of hind tarsi brownish-yellow. *Wings* pale grey; stigmatic cell yellowish. There is a blackish infuscation at the tip of the wing, reaching from about the tip of the 1st longitudinal vein to just below the 3rd vein. The appendix in the 1st posterior cell is very distinct. Halteres bright lemon-yellow.

Length, barely 8 mm.

Described from a single ♂ from Dibrugarh, Assam, 17–19. xi. 1911 (Abor Expedition, *Kemp*). *Type* in the Indian Museum.

Subfamily CERIINÆ.

Antennæ porrect, elongate, set on a somewhat produced frons; 3rd joint with an apical style; 3rd vein with a downward loop or angle into the 1st posterior cell, this loop often ending in the stump of a vein as in the MICRODONTINÆ; 4th and 5th veins not recurrent, but bent up at tip in the ordinary Syrphid fashion; 1st posterior cell closed nearly on wing-border, tip generally pointed.

The CERIINÆ are a well-defined group of rather large, wasp-like flies, which also resemble to some extent the flies of the subfamily

CONOPINÆ. The group consists mainly of the genus *Ceria* and its alleged subgenera. Though most of the species are tropical, a certain number extend to temperate regions. They are nearly always yellow and black elongated flies of moderate or large size, loving the sunshine, flowers and sweet-smelling plants.

Genus **CERIA**, *Fabr.*

Ceria, Fabricius, Ent. Syst. iv, p. 277 (1794).
Cerioides, Rondani, Ann. Soc. Ent. France, (2) viii, p. 211 (1850); de Meijere, Tijd. v. Ent. li, p. 192, notes and table of species (1908).
Sphiximorpha, Rondani, op. cit. p. 212.
Sphyximorpha, id., Dipt. Ital. Prod. i, p. 55 (1856).
Spiximorpha, id., op. cit. ii, p. 12 (1857).

GENOTYPE, *Musca conopsoides*, L., by universal acceptance *.

Head broader than thorax; eyes bare, closely contiguous for some distance in ♂, wide apart in ♀, in both sexes cut away sharply on inner upper angle in front; lower part of frons produced somewhat, bearing the antennæ; face descending almost perpendicularly from below antennæ, curving outwards to form the large obtuse lower part of head above upper mouth-border; antennæ long, porrect, placed on a slender elongate peduncle (*Ceria*) or

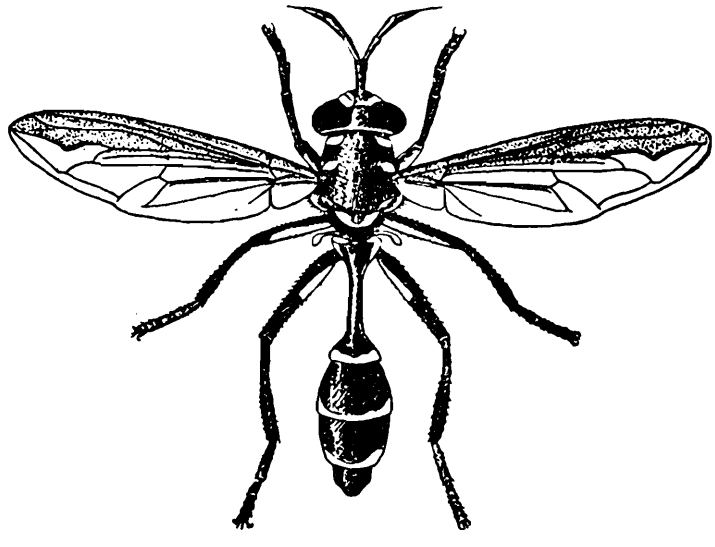

Fig. 71.—*Ceria javana*, Wied., ♀.

directly on the frons (*Sphiximorpha*); 1st joint cylindrical, 2nd cylindrical, much narrower and considerably shorter, 3rd usually as long as or longer than 2nd, elongate-oval, the tip pointed and bearing a narrow pointed terminal style. *Thorax* elongate quadrangular, with yellow spots; scutellum semicircular. *Abdomen* elongate, cylindrical, often punctate; or narrowed at base,

* I can trace no definite announcement of this species as type, Fabricius in 1794 having mentioned no species, but *conopsoides* has always been accepted as the genotype.

sometimes very considerably so (recalling that of a wasp), generally with yellow (occasionally reddish) bands. *Legs* moderately long and strong; tibiæ subclavate. *Wings* with characteristic venation; marginal cell widely open, 3rd vein with a distinct, more or less pointed loop downwards into the 1st posterior cell, from the tip of which a short stump of a vein projects some distance across the cell, which latter is more or less pointed at tip, closed near the wing-border; anterior cross-vein distinctly beyond middle of discal cell; 4th vein with traces of an appendix at point of upward deflection.

Range. World-wide.

Life-history. The larvæ of the European *C. conopsoides* have been found in the sap of diseased poplars and other trees and in ulcers on elms. They are described as elongate-oval, flat below, arched above, shagreened with small spines, with an anterior spiracular tubercle on either side near the hind margin of the prothoracal segment, and with a posterior spiracular process more than one-third as long as the body. Each body-segment has on either side two or three warts, each bearing a group of hairs or spines, and towards the hind end the warts become long filaments. (See Lundbeck, Diptera Danica, v, p. 588, 1916.)

This genus consists of a good number of moderately large or quite large wasp-like flies with well-defined yellow or reddish markings on their black bodies. The genus is very easily recognised when once known.

On the principle of continuity before priority I retain the generic name *Ceria* in preference to *Cerioides*; and I am inclined to recognise *Sphiximorpha*, Rond., as a good genus, in spite of the existence of some intermediate species, of which, however, none are known from the East *.

Table of Species.

1.	No antennal petiole (*Sphiximorpha*, Rond.)	2.
	A very long and conspicuous petiole (*Ceria*, F., *s. str.*) . ..	5. [p. 325.
2.	Humeri black	*fruhstorferi*, de Meij.,
	Humeri yellow. ..	3. [p. 325.
3.	Orange-brown species .	*fulvescens*, Brun.,
	Black-and-yellow species . ..	4.
4.	Third and 4th abdominal segments each with a pair of longitudinal yellow spots.	*decorata*, sp. n., p. 326.
	Third and 4th abdominal segments with only yellow bands on hind margins . ..	[p. 327. *triangulifera*, Brun.,
5.	(*a*) Second abdominal segment barely or not at all narrowed; 1st and 2nd segments generally subequal; or, 2nd a little or distinctly longer than 1st; 3rd always a little or distinctly longer than 2nd; 3rd and 4th subequal	6.

* *Vide* my notes, Rec. Ind. Mus. xi, p. 254 (1915).

	(*b*) Second abdominal segment short but very distinctly contracted basally or at about the middle; at narrowest part at least $\frac{1}{3}$ as wide as greatest width of abdomen, generally broader than this. *2nd segment always shorter than 3rd.*	9.
	(*c*) Second abdominal segment very long and very slender, much less than $\frac{1}{4}$ of the greatest width of abdomen. *2nd segment always distinctly longer than 3rd*	11.
6.	Two short longitudinal yellow spots on thorax behind suture .	7.
	No such stripes behind suture	8.
7.	A large, sulphur-yellow spot on each side of 1st abdominal segment; pale markings of thorax and abdomen sulphur-yellow.	[p. 329. *dimidiatipennis*, Brun.,
	No spots on 1st abdominal segment; markings on thorax and abdomen orange-brown	*brevis*, Brun., p. 328.
8.	First abdominal segment without a yellow spot on each side at base	*compacta*, Brun., p. 329.
	First abdominal segment with a distinct yellow spot on each side at base, often very large and conspicuous . .	[p. 331. *ornatifrons*, Brun.,
9.	Two short, elongate, yellow stripes on thorax behind suture	[p. 330. *himalayensis*, de Meij.,
	No such stripes present	10.
10.	Thorax with a spot at each end of suture, also an elongate vertically placed spot on either side on mesopleura; all these spots yellow. . .	*crux*, Brun., p. 332.
	No such spots present . . .	*fenestrata*, sp. n., p. 333.
11.	Two short, elongate yellow stripes on thorax behind suture .	12.
	No such stripes present . . .	15.
12.	A median, generally triangular, yellow spot between the post-sutural short stripes	[p. 333. *trinotata*, de Meij.,
	No such median spot	13.
13.	Orange-brown species; (legs all orange-yellow, including coxæ; frons and vertex brownish-orange, without obvious calli).	*polistoides*, sp. n., p. 335.
	Black-and-yellow species; (legs always with distinct black parts, even if only hind coxæ).	14.
14.	Third and 4th segments of abdomen with peculiarly shaped markings.	*patricia*, sp. n., p. 335.
	Abdominal markings consisting only of the normal hind marginal bands	[p. 336. *tredecimpunctata*, sp. n.,
15.	Brownish-orange species; wings yellowish-grey with a distinct brownish spot at tip.	[p. 337. *eumenioides*, Saund.,
	Black species, generally with pale markings; wings grey, more uniformly infuscated on anterior half . .	16.
16.	Body without pale marks, except that the humeri and hind margins of abdominal segments are very narrowly brownish-yellow.	*obscura*, Brun., p. 338.
	Body with yellow spots on thorax, abdominal segments with hind margins yellow	*iavana*, Wied., p. 339.

250. **Ceria fruhstorferi**, *de Meij.*

Ceria fruhstorferi, de Meijere, Tijd. v. Ent. li, p. 196, pl. vii, figs. 1, head, 2, 1st post. cell (1908).

♀ Very near *C. obscura*, Brun. *Head* very similar in form and colour; epistome rather more prominent; frons wholly black. Antennal petiole hardly noticeable, only the bump present, which, moreover, is rather shorter than broad; antennal joints relatively longer, 1st joint rather longer than 2nd, 3rd less than half as long as 2nd *, style very short, thick, black. *Thorax*: humeri black, scutellum without yellow margin, but with two oval spots forming a red, V-shaped figure in front of the margin. *Abdomen* with 2nd segment narrower and longer, its hind margin yellow, but the yellow band is interrupted in the middle; the sharply separated complex formed by the remaining segments is wholly black. *Wings* with anterior half, especially the veins, brown-tinged; the hind half is also somewhat brownish, and the 5th vein narrowly infuscated; apical cell only slightly bent inwards on upper side. Halteres yellow. *Legs* blackish-brown, knees reddish.

Length, 14 mm.

Sikkim, a single ♀ (*Fruhstorfer*). *Type* in Hungarian Museum.

251. **Ceria fulvescens**, *Brun.*

Ceria fulvescens, Brunetti, Rec. Ind. Mus. xi, p. 251, pl. xiii, figs. 20, thorax, 21, abdomen (1915).

♂ *Head*: hinder orbit of eyes lemon-yellow. The whole front part of the head lemon-yellow, except for a broad median brown stripe, which extends to the mouth, and is enlarged round the base of the antennæ into a diamond-shaped patch which occupies all the upper part, except for the rather narrow lemon-yellow border immediately contiguous to the eyes. The side corners of the diamond-shaped brown area just touch the eyes at about half their height, viewed from in front. The cheeks are wholly of a like brown colour, leaving a broad lemon-yellow space between them and the lower part of the median stripe. Ocellar triangle small, brown. Eyes closely contiguous for the short distance that they touch. Antennæ with 1st joint reddish-brown, or more nearly maroon; 3rd joint brownish-yellow, lighter towards tip; style brownish-yellow at base, the remainder yellowish-white. Back of head more or less yellowish or brownish-yellow. *Thorax* reddish-brown or ferruginous. Humeral calli lemon-yellow. There is a pre-alar lemon-yellow callus at each end of the transverse suture, and lemon-yellow coloured marks are placed as follows: two faint short lines from the anterior margin which nearly meet, and short transverse similar marks placed longitudinally along the transverse suture, one on each side of the middle; an elongate triangular mark on hind margin of dorsum, the base of the triangle coinciding with the margin; a narrow sublateral streak towards each side near the wings; a rather large

* An exception to the rule in this genus.

very clearly-cut mark on each of the meso-, sterno- and metapleuræ, the first one approximately oval, the others roughly circular. Scutellum reddish-brown, the base and hind margin rather broadly lemon-yellow; metanotum reddish-brown. *Abdomen* reddish-brown or ferruginous; a large triangular lemon-yellow spot on each side at the base of the strongly narrowed 2nd segment; posterior margins of 2nd and 3rd segments yellowish, that of the 4th also indistinctly so. Venter reddish-brown, a small lemon-yellow transverse spot towards the hind margin of 2nd segment. *Legs* uniformly ferruginous-brown. *Wings* pale yellowish; anterior half yellowish-brown, the colour filling the marginal cell and extending partly into the 1st basal cell. Stigma a little darker brown. Halteres with yellowish-white stems and reddish-brown knobs.

Length, 13 mm.

Described from a single ♂ from Bhowali, 5700 ft., Kumaon District, W Himalayas, vii. 1909 (*A. D. Imms*).

In Indian Museum. The uniform orange-brown colour of this species and the absence of antennal petiole separate it at once from all other Indian ones.

252. **Ceria decorata**, sp. nov.

♂ *Head*: eyes practically but not absolutely contiguous, and for a short distance only; vertex small, well raised, shining black, with rather dense, short greyish pubescence; ocelli small, shining brownish, rather close together Frons and face uniformly bright chrome-yellow with a large black triangular spot, its apex at upper corner of frons, its base just below base of antennal petiole, the lower corners extended as a fine line to each eye-margin; contiguous to this triangle a broad black median stripe on face, narrowed on each side just below the petiole, and narrowing towards tip of epistome. Antennæ black, 3rd joint a little dusted with dull grey, style pale yellow, Cheeks entirely black with a little ragged grey pubescence; occiput barely projecting behind eyes, black, a little greyish pubescence on margins. *Thorax* black; a distinct, rounded, somewhat large, pale yellow callus on humeri, and at ends of suture, an elongate one on the mesopleura, and a large round one on the sternopleura. Scutellum pale yellow with a round black spot in middle. *Abdomen* very dark brownish-black. 1st segment yellow on outer third on each side; 2nd with a broad pale yellow hind margin; 3rd with similar hind margin, to which is added towards each side an elongate spot placed longitudinally, its anterior end enlarged and reaching to about middle of segment; 4th segment similar, with a large patch of whitish dust on each side; 5th black, with dull yellow dust. Venter black; hind margins of segments pale. *Legs* mainly black or dark brown; anterior femora yellow, a black streak extending over inner and upper sides of apical half of fore pair; another streak on front side of middle pair extending a little upwards at base and tip;

hind femora black, a broad yellow ring filling nearly the middle third, incomplete on inner side. *Wings* yellowish-grey; anterior half down to 3rd vein brown; halteres pale yellow.

Length, 15 mm.

Described from a single ♂ in the British Museum, Rangoon, iii. 1881 (*Bingham*). The peculiarly-shaped elongate spots on the 3rd and 4th abdominal segments easily separate this species from the others in the *Sphiximorpha*-group.

253. Ceria triangulifera, *Brun.*

Ceria triangulifera, Brunetti, Rec. Ind. Mus. ix, p. 273 (1913).

♂ ♀ *Head*: eyes in ♂ contiguous for a very short space only; ocellar prominence filling entire vertex; a little golden-yellow hair just over junction of eyes. Frons black, rest of front part of head down to mouth-opening rather bright lemon-yellow. A large, semicircular black spot (convex side uppermost) embracing antennal prominence, joined to black upper part of frons by a somewhat narrow black stripe, and also joined by a black stripe below antennæ to an irregular elongate-triangular spot on face, apex downwards, with rounded angles and incurved on the two sides; the lowest part of this triangle does not quite reach the mouth-opening. Cheeks lemon-yellow, with a broad black stripe from lower corner of eye to lower corner of cheek. Mouth-parts blackish. Antennal prominence ferruginous-brown (there is no distinct petiole); basal half of 1st joint, apical half of 2nd and the 3rd joint wholly, black, the three joints forming an elongate club. A broad bright yellow band behind vertex and upper post-ocular orbit. Occiput black, yellowish towards sides. *Thorax* dull black with just perceptible black pubescence and lemon-yellow, more or less oval, spots placed as follows: on humeral calli, at each end of transverse suture, on mesopleura, and one placed transversely on sternopleura. A faint yellow line indistinctly along suture. Metanotum black. Scutellum yellow, with a basal, rather small, black semicircular spot. *Abdomen* black; 2nd segment often with a narrow dull reddish-brown tinge at base and tip. A large yellow spot at each side of 1st segment; hind margins of 2nd, 3rd and 4th segments yellow; a little yellow tomentum on hind part of 4th segment. *Legs*: coxæ black; anterior femora in ♂ mainly black, brownish-yellow at base and tips, in ♀ lemon-yellow, a little browner on apical half, with a black irregular streak on under side and a trace of one above; hind pair lemon-yellow basally, brownish-yellow apically with an intermediate black band which is considerably wider on under side and is much wider in ♂ than ♀ Tibiæ brownish-yellow, a little darker towards tips; hind pair moderately curved. Tarsi light brown. *Wings* grey; anterior part as far as spurious vein on basal half, and as far as 3rd vein on apical half, rather dark brown. Halteres yellow.

Length, 12 mm.

Described from one ♂ and several ♀ ♀ in the Indian Museum from Darjiling District, 1000–3000 ft., May 1912.

This species is evidently a variable one in several respects. Two ♂ ♂ and a ♀ in the British Museum from Thaungyin, Lower Burma, i.1891, iii. 1890 (*Bingham*), show variation in the coloration of the legs. One ♂ has the anterior femora bright yellow, the fore pair with a black streak on upper side; the coloration of the hind pair consists of a large oval yellow spot on outer and inner sides of the basal half (these spots being broadly united above basally), a large similar orange-brown spot on outer and inner sides of apical half (these spots joined above apically), while the remaining portion is black. All the tibiæ and tarsi, also the whole of the antennæ, are orange-brown. The head and body markings are identical with those of the typical form.

Another variety (from the Runjit Valley, Sikkim, v. 1894 (*Bingham*); Himalayas; Assam; S. Shan States, 4000 ft., xi. 1899 (*Bingham*)), represented by six specimens, including both sexes, presents the following minor differences:—Humeral and sutural yellow spots much smaller, yellow hind margin of scutellum very narrow, legs practically entirely dark brown, spurious vein narrowly but very distinctly infuscated, size larger, 13–15 mm. One of these specimens has the hind legs as in the Thaungyin form, with a yellow elongate spot on the basal half of the hinder side of the middle tibiæ. There seems no reasonable doubt that all the forms are conspecific.

254. Ceria brevis, sp. nov.

♀ *Head*: frons at vertex fully one-third, below antennæ nearly half, width of head; punctate, black. A brownish-yellow round spot on each side of the black face at level of antennæ, touching eye-margin, and a stripe from just below it down each side of face to upper mouth-border; the space between them at tip shining black, smooth, bare. Antennæ and petiole very dark mahogany-brown, 1st joint blackish. Hind part of head below yellow; occiput black, much produced behind upper margin of eyes, with two conspicuous orange-yellow round spots. *Thorax* black, closely punctate; yellow calli on humerus, mesopleura and sternopleura; the barest trace of a spot on either side at extreme end of suture; a small longitudinal vitta on either side of hind part of dorsum, near wing-base. Scutellum black, hind margin yellow. *Abdomen* black, closely punctate; 2nd, 3rd and 4th segments with thick orange-brown hind margins bearing microscopic pale pubescence; venter black. *Legs* black; tips of anterior femora narrowly, base and tip of hind femora more broadly, basal half and tips of tibiæ, and tarsi wholly, orange-brown. Pubescence of legs whitish, inconspicuous. *Wings* very pale grey; anterior half dark brown down to spurious vein and

3rd vein ; traces of a paler narrower spot towards tips in marginal and submarginal cells. Halteres orange-brown.

Length, 8 mm.

Described from a single ♀ (*type*) from the Pusa collection, sent to the British Museum, taken at Pusa "in a house," 2. iv. 1906. Allied to *C. compacta*, Brun. I have also seen one ♀ from Kashmir, 5000 ft., iv. 1901 (*Nurse*).

255. **Ceria compacta**, *Brun.*

Ceria compacta, Brunetti, Rec. Ind. Mus. ii, p. 95 (1908) ; i, pl. xiii, fig. 13, full insect (1907).

♀ Vertex broadly black, also a wide stripe below antennæ, and the lower part of the face and a transverse line just below the vertical black spot ; rest of face red, antennal protuberance reddish-brown, antennæ dark brown, 3rd joint nearly black. A little white hair behind the eyes and on lower part of head. *Thorax* wholly black except red shoulder-spots, and a vertical red stripe on each side a little in front of the wings ; scutellum entirely red. *Abdomen* black, dull, posterior edges of 2nd, 3rd and 4th segments with a thick but narrow red border. *Legs* red ; coxæ, a narrow ring at the base of the four anterior femora, and a ring extending to about two-thirds of the length on the hind femora (the extreme base of which is red), and a narrow, somewhat interrupted ring on the apical half of all the tibiæ, black. *Wings* clear ; brown from fore border to just beyond the 3rd longitudinal vein and including the whole of the lower basal cell. Halteres yellowish-red.

Length, 11½ mm.

Described from one ♀ taken by me at Mussoorie, W Himalayas, 22. vi. 1905. In my collection.

256. **Ceria dimidiatipennis**, sp. nov.

♂ ♀ *Head* : eyes in ♂ contiguous for only five or six facets ; upper facets slightly larger than others ; ocellar triangle small, black, behind it the considerably produced and rather elevated, thick occipital border is bright sulphur-yellow. Frons and face sulphur-yellow. Base of antennæ, a small curved stripe thence on each side to eye-margin, a narrow median line from base of antennæ to upper mouth-border, and a very broad band on each cheek, black. Antennæ black, petiole brownish-orange at base. Occiput black. In ♀, frons one-fourth of the head at vertex, with broad black transverse band from eye to eye but not descending to antennæ, connected by a narrow line across the yellow occipital vertical region (dividing latter into two elongate spots) with the narrow, black hind margin of that region. A transverse stripe below antennæ, broader and straighter than the

two curved stripes in ♂; cheeks wholly black to hinder part of head. *Thorax* black, with a dark blue tinge; closely punctate sulphur-yellow calli of the usual shapes on humeri, at ends of suture, on mesopleura and on sternopleura; a very short obvious but not conspicuous narrow yellow vitta towards each side of dorsum behind suture, at the place where the longer vittæ are present in *trinotata*, de Meij. Scutellum wholly sulphur-yellow. *Abdomen* black with a bluish tinge, closely punctate. A large sulphur-yellow spot on basal corners of 1st segment, extending at sides to hind margin; a thick yellow hind border to 2nd, 3rd and 4th segments, rather broader on latter and slightly wider in middle. Ground-colour in some places irregularly yellowish-grey tomentose: whole abdomen with microscopic pale yellow pubescence. Venter black, a whitish hind margin to 2nd segment and a brownish-yellow margin to 3rd; 4th with only traces of a lighter margin. *Legs*: coxæ black; femora yellow; a short streak on upper side near tip and a longer one below on anterior pairs, that on middle pair extending nearly from base to tip, in all cases the streaks liable to a little dilatation; hind femora with a similar black streak on apical third above and below, the intervening spaces brownish-orange. Tibiæ pale yellow on basal half, brownish-yellow on remaining parts, the colours apparently varying a little in extent. Tarsi yellowish-brown, darker above, especially hind pair. *Wings* very pale grey; anterior half rather dark brown as far as the spurious vein and 3rd vein, except that the loop of the latter is clear. Halteres yellowish.

Length, 9–10 mm.

Described from two ♂ ♂ and a ♀ from the Pusa collection: Hangu, North-West Frontier Province, 10. v. 1916 (*Fletcher*, *type* ♂ and *paratype* ♂); Abbottabad, North-West India, vi. 1916 (*Fletcher*, *type* ♀). I have also seen examples from Quetta, v & vi. 1902, and Kashmir, 5000–6000 ft., v. 1901 (both *Nurse*). This species bears a general resemblance to the European *C. conopsoides*, L.

Type ♂ and *type* ♀ sent to the British Museum.

257 **Ceria himalayensis**, *de Meij.*

Ceria himalayensis, de Meijere, Tijd. v. Ent. li, p. 198 (1908).

♀. Frons and vertex brownish-yellow; epistome yellow with broad black median stripe; a black stripe between base of antennæ and each eye. Antennal petiole reddish-brown; antennæ blackish, becoming rather reddish in parts; 2nd and 3rd joints subequal; 1st joint rather longer than these, but distinctly shorter than the petiole. *Thorax* black with yellow humeri; two longitudinal yellow stripes behind suture near side margins; pleuræ with a yellow stripe from wing-base downwards, and a yellow spot on upper part of sternopleura. Scutellum reddish-yellow, narrowly black at base. *Abdomen* black, with narrow yellow hind margins to

2nd, 3rd and 4th segments; 2nd segment but little longer than 1st, that is relatively short, although rather strongly narrowed. *Legs* reddish-brown. *Wings* with a broad black costal border; 2nd basal cell also wholly darkened. Upper side of 1st posterior cell deeply looped downwards but without appendix; halteres yellow.

Length, 12 mm.

Described by de Meijere from a unique ♀ from Sikkim in the Hungarian Museum. There is also a ♀ in the British Museum from Runjit Valley, Sikkim, iv. 1894 (*Bingham*). Very near *compacta*, Brun., differing by having the vertex wholly yellow, the two yellow stripes behind the suture and the almost unicolorous legs.

258. **Ceria ornatifrons**, *Brun.*

Ceria ornatifrons, Brunetti, Rec. Ind. Mus. xi, p. 252, pl. xiii, fig. 22, head, front view (1915).

♂ ♀ *Head*: occipital margin moderately wide directly behind frons and upper part of eyes, but disappearing at about the middle of the eyes; it is bright light reddish-brown, with a small lemon-yellow triangular spot at the inner corner of each eye. Eyes in ♂ at nearest point of approach very narrowly separated. The space between the eyes across the middle of the head in ♀ is equal to nearly half that width. Upper part of frons light red. On each side of the frons, on a level with the antennæ, is a semi-circular lemon-yellow callus-like spot, its convexity contiguous to the eye-margin. Barely separated from the lowermost part of this spot is, on each side, a nearly vertical lemon-yellow stripe, contiguous to the eye-margin for a short distance, and then, bending inwards, proceeding to the mouth, above which the two stripes meet. At the point where the stripes quit the eye-margin, there is (but on the inner side of each stripe) a projecting finger-like mark running towards the centre of the face. The whole space round the base of the antennæ and the part of the face comprised between these two pairs of yellow callus-like markings is moderately dark brown, punctuated by a number of fine black spots. The sides of the head below the eyes, *i. e.* the cheeks, are lemon-yellow, and there is a broad reddish-brown stripe between each cheek and the yellow vertical facial stripe. Antennal 1st and 2nd joints brownish-yellow (3rd joint missing). The head is placed very broadly and squarely on the thorax, no vestige of neck being apparent. *Thorax* broad; reddish-brown, with a little hoary bloom when viewed from certain directions. Humeral calli lemon-yellow; a small oval lemon-yellow spot on the mesopleura; transverse suture narrowly yellowish. Scutellum wholly dull lemon-yellow; metanotum reddish-brown. *Abdomen*: 1st and 2nd segments reddish-brown, a conspicuous lemon-yellow callus on each side at the base of the 1st segment.

An indistinct though obvious circular black spot in the middle of the dorsum of the 2nd segment; 3rd and 4th segments dark reddish-brown or brown; posterior margin of each with a thick lemon-yellow band, whole abdomen with a slight greyish bloom. Venter concolorous, with an indistinct yellow band on hind margins of 2nd and 3rd segments. *Legs* (fore pair missing) light reddish-brown with a hoary bloom; knees and base of tibiæ a little yellowish in certain lights. *Wings* clear; anterior part yellowish-brown, the colour reaching to the spurious vein. A subapical blackish spot of some size extends from the costa posteriorly just below the 3rd vein and reaches basally to about level with the anterior cross-vein; the wing-tip below this subapical spot is lightly blackish; no obvious stigma. Halteres reddish-brown.

Length, 9 mm.

Described originally from one ♀ from Kumdhik, base of Nepal Himalayas, 22. iii. 1909: in the Indian Museum collection. I have also seen examples (♂ ♀) from Singla, Darjiling District, 1500 ft., iv. 1913 (*Lord Carmichael's collector*).

259. **Ceria crux**, *Brun.*

Ceria crux, Brunetti, Rec. Ind. Mus. xi, p. 253 (1915).

♀ *Head* black; a bright yellow, moderate-sized, round spot on each side of frons between base of antenna and eye, contiguous to latter but not to former; a broad yellow stripe on each side of face, beginning in a point just below the circular spot, broadening rapidly, thence gradually narrowing to a point at the mouth-border; these four yellow spots leave a black cross, viewed from in front of the head, extending from vertex to mouth-opening. Antennæ black, 1st joint, which is nearly as long as 2nd and 3rd together (these two being subequal), reddish-brown, especially on under side: apical style of 3rd joint conical, with short narrow elongate tip. A little yellowish or greyish pubescence, almost tomentum, behind vertex, some slight grey pubescence on lower part of ocular orbit. *Thorax* black; a bright yellow spot on each humerus, a triangular one at each end of the transverse suture, which itself bears a thin greyish line; a bright yellow vertical stripe on mesopleura and a round similarly coloured spot on sternopleura, both stripe and spot nearly in a line with the spot at the end of the transverse suture. Scutellum bright yellow, black at base. *Abdomen* black, anterior corners of 1st segment with a round bright yellow spot; hind borders of 2nd, 3rd and 4th segments with a moderately wide well-defined band of same colour. 1st segment contracted distinctly but not greatly towards tip, and 2nd segment equally contracted at base; the contracted part at its narrowest point being one-third as wide as the abdomen at its broadest part. *Legs*: coxæ blackish; anterior legs ferruginous-brown, traces of an indistinct blackish ring on all tibiæ beyond the middle; hind femora blackish, except

at base, tip and under side; tarsi a little darker. *Wings* grey; anterior half from base to tip, and as far hindwards as just beyond 3rd longitudinal vein, blackish-brown, the colour darker here and there; basal half of 1st basal and whole of 2nd basal cell also dark brown, costal cell clearer. Halteres bright yellow.

Length, 10 mm.

Described from a perfect unique specimen in the Indian Museum from Kousanie, Kumaon, W Himalayas, 6075 ft., vii. 1914 (*Col. Tytler*).

260. **Ceria fenestrata**, sp. nov.

♀ *Head* black; a small, pale yellow, round spot on each side contiguous to eye-margins at level of base of antennæ; and, beginning just below this point, an elongate curved spot on each side, extending from eye-margin to tip of epistoma, leaving a broad, black median stripe. Antennal petiole dark brown; antennæ black, style of 3rd joint whitish. Occiput black, rather well developed behind vertex but not projecting behind middle of eyes at all. *Thorax* entirely black; humeri with distinct brownish-orange calli; there are narrow traces of similar colour along the suture, and traces of greyish dust on lower part of pleuræ; scutellum wholly black. *Abdomen* black; 1st and 2nd segments subequal, appearing almost fused into a single segment, sharply contracted at their point of union, the narrowest part occurring at base of 2nd segment; 1st and 2nd segments together not so long as 3rd; 3rd a little longer than 4th; 2nd and 3rd with a broad, clear-cut, brownish-orange hind margin, 5th segment dark brown. Venter dark brown. *Legs* blackish-brown, knees narrowly, and tarsi indistinctly, brownish-orange. *Wings* pale yellowish-grey, iridescent; dark brown from anterior margin to spurious vein, from whence the colour is limited by the 3rd vein; the brown colour also wholly fills the 2nd basal cell, but the hinder half of the apical part of the 1st basal cell (*i. e.*, from base of 2nd posterior cell to tip of 1st basal cell) is hyaline. Halteres black at base and tips, yellowish in middle part.

Length, 11 mm.

Described from a single ♀ in the British Museum. Runjit Valley, Sikkim, v. 1894 (*Bingham*).

The small, window-like, narrow, clear space at the tip of the 1st basal cell, and the marked shortness of the 2nd segment are the most conspicuous characters of the species. It bears some resemblance to my *C. compacta*, but this latter has the abdomen scarcely narrowed at all at the base.

261. **Ceria trinotata**, *de Meij.*

Ceria trinotata, de Meijere, Bijd. tot Dierk. xviii, p. 97 (1904).

♂ ♀ *Head*: eyes in ♂ contiguous for a short space only. Vertex well elevated, consisting of two large pale yellow calli with short yellowish pubescence; a minute black space intervenes

between these calli at the extreme vertex, and there is a very small black ocellar triangle. Frons and face uniformly rather pale yellow except for a black triangular spot on which the antennal prominence is placed, and a broad black stripe thence to tip of mouth-border; also a still broader stripe on either cheek, extending from eye to mouth. A little pubescence on frons. Antennæ dark blackish-brown, style short, white. Occiput black, a broad pale yellow margin with a little concolorous pubescence, the margin only extending beyond the eyes in the vertical region. In ♀, eyes more broadly separated than in *javana*; rest as in ♂. *Thorax* moderately shining black, closely punctate; with pale or bright yellow calli as in *javana*, and, in addition, a narrow, longitudinal yellow stripe towards each side of dorsum, reaching from suture nearly to hind margin, and also a triangular (or inverted heart-shaped) spot between these stripes in front of the hind margin. Scutellum black, hind border yellow, the colour reaching up the sides nearly to the base; metanotum shining black. *Abdomen* black, closely punctate. Two spots closely united at each side of base of 1st segment; 2nd segment shaped as in *javana*; hind borders of 2nd, 3rd and 4th segments as in *javana*, except that the band on the 4th segment does not turn upwards at the sides; also there is on this segment an elongate, yellow-tomentose, oblong spot towards each side, near but not on the hind border, yet extending to the side margins. Venter black, hind margins of segments indefinitely pale. Pubescence of abdomen inconspicuous, black or dark brown. *Legs*: coxæ black; femora narrowly black at base; proximal half of remainder mainly yellowish, distal half pale brown; an indefinite black streak on upper side of front pair just beyond middle, on lower side of middle pair, and on upper side of hind pair towards tips; the hind pair also have an irregular blackish ring in the middle, extending on the upper side into a longitudinal streak reaching nearly from base to tip. Tibiæ yellowish on basal half, more brownish distally, rather broadly and indefinitely blackish beyond middle. Tarsi brown, tips black. Pubescence of leg yellow, inconspicuous. *Wings* as in *javana*.

Length, 18–21 mm.

Described from several of each sex in very indifferent condition, apparently through having been preserved in spirit. Darjiling District, 1000–3000 ft., v. 1912 (*Lord Carmichael*); Singla, Darjiling District, iv. 1913; Tenasserim (*Doherty*): all the foregoing specimens are in the Indian Museum. In the British Museum are examples from Matheran, Western Ghats, Bombay, 2250 ft., iii. 1899 (*Nurse*); Runjit Valley, Sikkim, v. 1894 (*Bingham*); Assam; Tavo Plateau, 4000 ft., iii. 1890, and Thaungyin, iii. 1890 (both Lower Burma, *Bingham*); Luang Prabang, 3. iv. 1918, and Haut Mekong, 30. iv. 1918 (both Indo-China, *R. V de Salvaza*). The species was originally described from Bengal.

262. Ceria polistoides, sp. nov.

♀ *Head* bright yellow; vertex broadly brownish-orange, slightly raised; two impressed lines crossing each other diagonally in middle of frons; a rather narrow median facial stripe, and a similar one on either cheek, both facial and cheek stripes brownish-orange, and the upper part of the facial stripe outlined at sides with black; a small black spot on each side just below base of antennal petiole; the latter, and the antennæ, wholly brownish-orange. Occiput only moderately prominent behind the vertex and only for a short space; again prominent in the lower part, but flush with eye-margins at their middle; bearing a little white hair below, but bare elsewhere. *Thorax*: greater part of dorsum black, side margins moderately broadly brownish-orange; there are large, bright yellow spots of the usual shapes on humeri, at ends of suture, with three on either side on the pleuræ, those on mesopleura and pteropleura not contiguous. A pair of stripes on hinder half of dorsum extends from suture nearly to hind margin, and there are two narrow, short, transverse spots of yellow pubescence along the suture. A brownish-orange frenulum or ridge joins the base of the wings with the scutellum; and there is a small brownish-orange, triangular, rather indistinct spot on the anterior margin of the dorsum on each side, contiguous to the humerus. Pleuræ black, with a little whitish dust; narrowly brownish-orange between the upper two of the pleural yellow spots and also below wing-base. A large yellow spot at hinder end of sternum. Scutellum yellow. *Abdomen* brownish-orange; 1st segment yellow on basal half, rest black, the latter extending forwards in centre; 2nd narrowly yellow at base, remainder with a rather reddish tinge; hind margins of 2nd, 3rd and 4th with moderately broad, well-defined, bright yellow bands, the minute black bristles in front of these hind margins causing the surface in that region to appear darkened; 4th segment indistinctly white-dusted about middle; a little whitish pubescence at sides of 2nd segment. *Legs* bright orange; basal half of hind femora and of hind tibiæ lemon-yellow, that of the anterior pairs also lemon-yellow but less distinctly so; last two joints of hind tarsi dark brown. *Wings* pale yellowish-grey; anterior half, to 3rd vein, yellowish-brown, the veins a little more darkly suffused.

Length, 13 mm.

Described from a single ♀ in the British Museum, from Simla, v. 1897 (*Nurse*).

263. Ceria patricia, sp. nov.

♂ ♀ *Head*: eyes in ♂ quite contiguous for a short distance; vertical triangle conspicuously elevated, extending back somewhat, orange, with a central black spot bearing the ocelli and a short

black stripe reaching thence to the hind margin; a rather narrow median black stripe extending from upper angles of frons, encircling base of antennal petiole, to tip of epistome; a very broad stripe on cheeks, leaving hinder part narrowly yellow. Antennæ and petiole wholly black or dark orange-brown. Occiput narrowly projecting, but only behind upper part of eye-margins, with a short yellow fringe on the upper part and a white fringe on the lower part. In ♀, vertical region much elevated; orange-yellow on either side on outer third, middle third black; a black transverse band from eye to eye across middle of frons. *Thorax* black, with bright yellow spots placed as follows: a humeral one, rounded above, pointed below; a sutural, rounded in front, nearly linear behind; a pair of yellow dust-spots lying along middle of suture, their inner ends rounded, their outer ends fading to a point; an elongate stripe towards each side reaching from suture nearly to hind margin; a mesopleural spot, oval, pointed below; a pteropleural, subtriangular, and a sternopleural, rounded spot. A little very short whitish pubescence on dorsum. Scutellum black, with a broad yellow hind margin. *Abdomen* black; 1st segment with a large yellow spot on each side; 2nd more or less dark brown (♂) or orange-brown (♀); hind margins of 2nd, 3rd and 4th segments with a distinct yellow band, which on the 3rd segment turns forwards along either side for a short distance, then back towards the centre of the disc as an elongate spot. 4th segment similar to 3rd, the elongate side-spots larger; a pair of median spots present, roughly triangular, with their inner sides parallel and extended upwards in a short line. *Legs* mainly brownish-orange; coxæ black, base of anterior femora black for a short distance, basal half of hind pair pale yellow (less distinctly so in ♀); hind pair with a black speck on basal half of their upper side in ♂, and a small black streak in middle of under side. Tibiæ indistinctly blackish about the middle and tarsi blackish towards tips; in ♀, tibiæ and tarsi wholly orange. Coloration of legs probably variable. *Wings* yellowish-grey, pale brownish-yellow as far as 3rd vein; no stigma; halteres orange.

Length, 20 mm.

Described from one pair from Tavoy, Tenasserim, Lower Burma, x. 1893 (*Bingham*); in the British Museum.

264. **Ceria tredecimpunctata**, sp. nov.

♂ ♀ *Head*: eyes in ♂ closely contiguous for a short distance; vertical triangle shining black, with dense brownish-yellow pubescence. Frons and face chrome- or lemon-yellow; a black triangle includes the base of the antennal petiole, and its angles are joined by fine lines to the eye-margins; there is a rather broad median black stripe on the face and a very broad black stripe on either cheek. Antennal petiole black; 3rd joint of antennæ brownish, tip of style whitish. Occiput very narrow behind vertex, not

projecting behind middle of eyes in profile, with short, concolorous pubescence; lower part of head with a little yellow pubescence. In ♀, head more translucent yellow, vertex broadly black. *Thorax* black, with yellow spots on the humeri, at the ends of the suture, on mesopleura and sternopleura, and with a long post-sutural yellow spot towards each side; scutellum black with a moderately broad yellow margin, which is narrowly connected by a fine yellow line with the base of the wing on each side. *Abdomen* black; a yellow mark consisting of two contiguous spots on each side of 1st segment; 2nd, 3rd and 4th segments with yellow hind margins; some rather long, fine hair on 1st and 2nd segments at sides; 5th segment shining black, with black pubescence; rest of abdomen appearing dull, owing to the extreme density of the microscopic bristles covering it. *Legs* mainly black; nearly basal third of fore femora, a large oval spot on basal half of middle pair and about basal quarter of hind pair, lemon-yellow; about basal half of anterior tibiæ more or less yellowish; hind tibiæ orange-brown below. Pubescence of legs pale yellow, inconspicuous; a little more obvious on hind femora and on apical half of hind tibiæ. *Wings* pale grey; anterior half moderately dark brown as far as 3rd vein; halteres pale yellow.

Length, 15–16 mm.

Described from 1 ♂, Salween Valley, Burma, viii. 1894 (*Bingham*), and 1 ♀, Lower Ranges, Khasi Hills, Assam, 1878 (*Chennell*); both in the British Museum. The markings of the ♀ are paler and more ochraceous than those of the ♂

265. **Ceria eumenioides**, *Saund.* (Pl. VI, fig. 8.)

Ceria eumenioides, Saunders, Trans. Ent. Soc. Lond. iii, p. 60, pl. v, figs. 6, *a–d*, full ins. col., etc. (1841).

Ceria apicata ("Bigot, *nom. nud.*")*, Brunetti, Rec. Ind. Mus. ii, p. 95 (1908).

♂ ♀ *Head* transverse, slightly broader than thorax. Eyes in ♂ absolutely contiguous for about half the distance from vertex to upper angle of frons, the upper facets only for a small space distinctly larger than the others. Frons and face pale to deep yellow, with a pale brownish-orange stripe on either side delimiting the cheek. Occiput wholly yellow, distinctly prominent behind vertex (the ocellar region obviously swollen and rather orange) but narrowing rapidly on each side. Antennæ, with pedicel, entirely orange-yellow, varying a little in individuals. In ♀, eyes with rounded upper inner corners, separated by between $\frac{1}{4}$ and $\frac{1}{5}$ width of head; sometimes there is a pale orange stripe across upper part of frons. *Thorax* light reddish-brown; bright lemon-yellow calli on humeri, on ends of suture (extending as a very narrow line for a short distance across dorsum), on mesopleura, sternopleura and pteropleura; the callus on the pteropleura is triangular

* Apparently merely a MS. name of Bigot's in the Indian Museum collection.

and fits closely to those on the sternopleura and mesopleura. Scutellum yellow, with basal part blackish; the blackish area varies in extent from a very narrow basal portion to the greater part of the surface. *Abdomen* bright reddish-brown; 1st segment very narrowly yellow at base; 2nd very narrow for three-fourths of its length; its hind margin has a distinct yellow band; 3rd segment with a yellow band on the hind margin, this band widening towards the sides and narrowing again just before the extreme side margins of the dorsum; 4th segment narrowly brown at base, remainder yellow-dusted with a distinct yellow hind margin, which spreads forward up either side of the segment as a large spot, leaving the extreme side margin wholly clear; 5th segment very small, yellow-dusted. *Legs* brownish-orange; front femora with a long pale lemon-yellow streak below; hind femora pale lemon-yellow on basal half. *Wings* yellowish-grey, deeper brownish-yellow on anterior half down to about the spurious vein; tips of 2nd and 3rd veins, including the loop of the latter, distinctly and rather broadly suffused with dark brown. Halteres yellow.

Length, 15–20 mm.

Described originally from Northern India. The present description is drawn up mainly from two ♀ ♀ in the Pusa collection from Kohat, North-West Frontier Province, 7 v. 1916 (*Fletcher*), two ♀ ♀ from Matheran, Bombay Presidency, iii & v. 1899 (*Nurse*), and one ♀ from Chapra, Bengal (*Mackenzie*). This species occurs also at Calcutta; at Abbottabad, Hazara District, 21. v. 1915 (*Fletcher*); and in Northern Bengal (Saunders Collection).

Saunders's *type*, in the British Museum and in excellent preservation, agrees closely with the above-described specimens.

266. **Ceria obscura**, *Brun.*

Ceria obscura, Brunetti, Rec. Ind. Mus. ii, p. 94 (1908); i, pl. xiii, fig. 12, full insect (1907); de Meijere, Tijd. v. Ent. li, p. 196, pl. vii, figs. 3, head, 4, first posterior cell (1908).

♂ ♀ *Head*: in ♂, frons and face pale yellow, marked with a large black cross, composed of a broad longitudinal stripe extending from upper corner of frons practically to mouth-border, and of a transverse, rather angulated band reaching from eye to eye just below the base of the antennal stem. Antennæ black, with joints subequal, and the stem a little longer than the 1st joint. In ♀, frons and vertex wholly black, with a thin yellow **V**-shaped mark below the antennæ. *Thorax* dull black, humeral calli tawny; scutellum black, the posterior edge narrowly yellow. *Abdomen* black; basal three-fourths of the contracted 2nd segment brown; posterior borders of 2nd and 3rd segments narrowly yellow; 4th with a distinctly wider black border; 5th black, small. *Legs* all dark brown, the outer sides of the tarsi with a little grey pubescence. *Wings* grey, dark brown from the costal border; the latter colour extends over both basal cells and to

about half-way between the 3rd and 4th longitudinal veins, and reaches to the wing-tip at the termination of these two veins. The lower half of the discal cell is thus clear.

Length, 12½ mm.

Described from one ♀ in the Indian Museum collection, from Sikkim. De Meijere records a ♂ from the same locality. I have seen examples from the Runjit Valley, Sikkim, v. 1894 (*Bingham*); Taungu, Sikkim, xi. 1888 (*Bingham*); and from Assam.

267 **Ceria javana**, *Wied.* (Text-fig. 71, p. 322.)

Ceria javana, Wiedemann, Anal. Ent. p. 32 (1824); id., Auss. Zweifl. ii, p. 81 (1830).

♂ ♀ *Head* black: in ♂, frons and face pale to deep yellow; a broad black median stripe runs from top of frons to mouth-border, and a transverse black band just below antennæ reaches from eye to eye. In ♀, vertex broadly black, cheeks wholly black in both sexes. Antennæ black, petiole black or very dark brown, paler below; 3rd joint brownish, grey-dusted, apical bristle rather long. Occiput black, with yellowish tomentum on side margins; narrowing above, with a continuous fringe of short white hairs and of yellowish and brown pubescence behind vertex. *Thorax* black, closely punctate, with indefinite traces of a yellowish tomentose median stripe, which reaches to the hind margin where it broadens and slightly divides. Conspicuous bright orange-yellow calli on humeri, at each end of suture, on mesopleura, pteropleura and sternopleura. Scutellum yellow, with a central black spot reaching from base to hind border, where it narrows considerably. Pubescence of thorax inconspicuous, very short, black; that of scutellum brown, very short; frenulum very distinct, pale yellow; metanotum shining black, bare. *Abdomen* slightly shining black, closely punctate. 1st segment with two large yellow calli on each side at base; 2nd segment over four times as long as 1st, extremely narrow and dark brown for three-quarters of its length, then black and suddenly widened; 2nd, 3rd and 4th segments with thick, pale yellow to brownish-orange hind margins, which on 3rd and 4th segments respectively extend forwards at sides nearly to the middle of the segment. Pubescence of abdomen yellowish-brown; there is a little soft, white, longer pubescence at the sides of the first two segments; venter shining black, with traces of yellowish bands on hind borders of 2nd, 3rd and 4th segments. *Legs* black or very dark mahogany-brown; there is a long, bright yellow, well-defined streak on the lower surface of the fore femora and on the hind surface of the middle femora, these streaks in both cases reaching nearly from base to tip; on the inner and outer sides of the basal half of the hind femora the stripes are so large as to be only narrowly separated. Pubescence of legs inconspicuous, generally concolorous with ground-colour. *Wings* pale grey; anterior half, down to just

behind 3rd vein, and including all basal half of 1st basal cell, rather dark brown; 5th vein narrowly suffused with brown up to base of discal cell; halteres yellow, tips of clubs dark.

Length, 16–20 mm.

Described from various ♂ ♂ and ♀ ♀ in the British and Indian Museums. Darjiling District, 1000–3000 ft., v. 1912 (*Lord Carmichael*); Sukna, 500 ft., 2. vii. 1908 (*Annandale*); Sidapur, Coorg, S. India, 3000 ft., 29. iv. 1917; Margherita, Assam. Originally described by Wiedemann (*ex* coll. Westermann) from Java, this species is also known from Malacca, Singapore, Sumatra and Borneo.

Family CONOPIDÆ.

Head large, broader than thorax, bare, loosely attached by a narrow neck; vertex inflated or vesiculose; ocelli absent (CONOPINÆ) or present (MYOPINÆ); eyes bare, wide apart in both sexes; epistome broad, perpendicular or slightly receding, descending often considerably below eyes; mouth-opening large, with an oral bristle on each side; proboscis long or very long, thin, usually projecting horizontally or downwards, geniculated at base

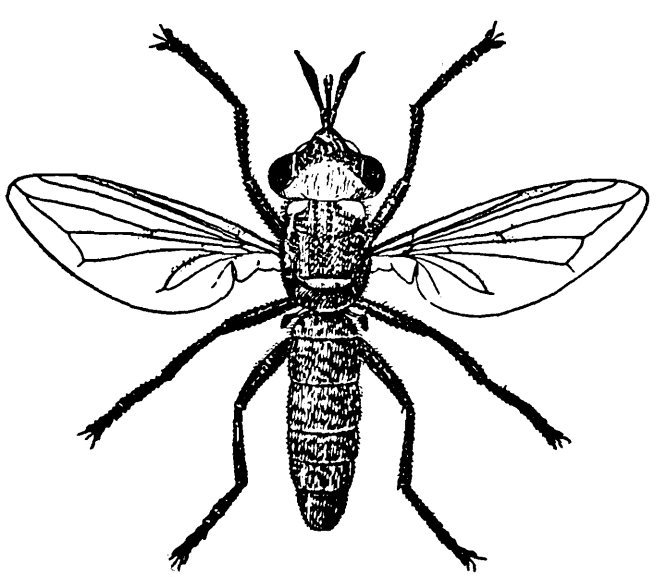

Fig. 72.—*Conops erythrocephalus*, Fabr.

only (CONOPINÆ and *Zodion*) or also in the middle (MYOPINÆ except *Zodion*); labella very narrow and short; palpi varying in length and shape, cylindrical or clavate. Antennæ porrect, 3-jointed; last two joints often at a distinct angle to the basal one; generally elongate, with a short apical style (CONOPINÆ) or with a style-like dorsal arista (MYOPINÆ). There is an inflatible ptilinum above the antennæ. Occiput inflated to a varying extent.

Thorax comparatively short, subquadrate, nearly or quite bare, rarely longer than broad; scutellum semicircular. Thoracic squamæ small.

Abdomen 6- or 7-segmented, cylindrical, thinly pilose or bare, generally slightly curved downwards, usually narrower than thorax, sometimes much constricted at base; its tip is more or less clavate. Genitalia in ♂ not very prominent, thread-like; in ♀ consisting of a large basal segment with apical processes, and generally comprising also a large shield-like organ on the under side of the 5th segment*. Ovipositor in *Dalmannia* (not an Oriental genus) long; in *Stylogaster* extremely long and horny.

Legs moderately long and stout, nearly or quite bare, of uniform shape except for the thickening of the femora in some genera; tarsi furnished with two distinct pulvilli.

Wings either comparatively long and narrow or of moderate width, in one genus (*Stylomyia*) cuneiform; auxiliary vein and 1st and 2nd longitudinal veins straight or nearly so, ending between the middle of the costa and a point at about three-fourths of its length; 3rd and 4th veins ending near apex of wing, diverging considerably beyond anterior cross-vein, converging towards their distal extremities, causing 1st posterior cell to be either narrowly open or closed on the wing-border or shortly petiolate; subcostal cross-vein (in CONOPINÆ and in the genera *Zodion* and *Pleurocerinella* of MYOPINÆ) situated near tip of auxiliary vein, sometimes weak; anterior cross-vein usually at about the middle of the very elongate discal cell, in some genera beyond the middle; posterior cross-vein erect or sloping; 5th vein forked (simple in *Stylomyia*), its upper branch meeting the discal cell near its base, forming the lower side of this cell and ending at the wing-border, its lower branch joining the 6th (anal) vein towards the wing-border; anal cell normally elongate, always closed and petiolate, sometimes very short; anal angle of wing normally well developed; alulæ sometimes very large; squamæ either moderately large, small or rudimentary.

Life-history. In species in which this is known, the larvæ are parasitic on adult bees, wasps or Orthoptera. Williston states that in some cases the eggs are deposited on the hosts during flight, and that the larvæ, when hatched, burrow into the abdomen. The adult CONOPIDÆ escape by passing between the segments of the abdomen of the host, and such an emergence from the body of a living bee has even been watched. One European species, *Conops quadrifasciatus*, De Geer, develops in the bee, *Bombus lapidarius*. Other hymenopterous genera acting as hosts of

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* Several authors have confused the sexes, though Schiner clearly differentiated them, and I must plead guilty to having made the same error in my previous descriptions of species of this family. Moreover, the shield-like organ has been erroneously referred by some authors to the 4th instead of the 5th segment.

Conops or *Physocephala* are *Vespa*, *Odynerus*, *Osmia*, *Halictus*, *Pompilus*, *Sphex* and *Bembex*; *Myopa* breeds in *Andrena* and *Vespa*; *Zodion* in *Hylæus*; *Stylogaster* is probably parasitic on ants (*Eciton*). The larvæ are amphipneustic, oval or pyriform, with distinct segments, wart-like antennæ, mouth-hooklets strongly bent, and the last segment bearing two large round or reniform stigmatic plates arched like a watch-glass; the puparium is oval or barrel-shaped. Dr. de Meijere published comparatively recently* an elaborate paper on the biology of this family, and this work should be studied by those interested in the subject. Dr. P. Speiser also discussed the bionomics of the family in a paper published in 1910†.

The CONOPIDÆ are a restricted group of flies varying in size from moderate to rather small. They are of world-wide distribution, but, with the exception of a few species, occur sparingly. The CONOPINÆ bear considerable resemblance to wasps and to the subfamily CERIINÆ of SYRPHIDÆ. They are mostly bare, or practically so, while some of the MYOPINÆ are clothed with short pubescence. The insects of this latter subfamily are of more muscoid appearance, and by some recent dipterologists have been included in the MUSCIDÆ, *sensu latissimo*. The genus *Stylogaster*, hitherto only recorded from Africa and South America, is less conopoid in general appearance but is, I think, allied to *Zodion*. In all the genera the species seem variable, and in many cases I have found it impossible to ascertain their limitations. Examples of a number of species, in perfect condition, collected by Colonel Nurse, have formed an important part of the material on which I have worked.

Table of Subfamilies.

Ocelli absent; 3rd antennal joint terminating in a distinct, 2-jointed, apical style ..	CONOPINÆ, p. 343.
Ocelli present; 3rd antennal joint normally terminating in a 2-jointed, dorsal, sometimes style-like arista (*Pleurocerinella* has a true 2-jointed style) . .	MYOPINÆ, p. 367.

The first subfamily consists of larger species, generally of a more or less wasp-like appearance; the representatives of the second subfamily have points of resemblance both with CONOPINÆ and with MUSCIDÆ, with which latter family they have been sometimes incorrectly united.

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* Tijd. v. Ent. xlvi, p. 144 (1903).

† Schriften d. Physik-ökonom. Ges. Königsberg, Jahrgang 50, pp. 177–183 (1910).

Subfamily CONOPINÆ.

The two Oriental genera may be distinguished as follows:—

Femora, especially hind pair, suddenly incrassated towards base; tibiæ more irregularly thickened; anterior cross-vein situated at about two-thirds the length of the discal cell; basal segments of abdomen considerably narrowed	[Sch., p. 355. PHYSOCEPHALA,
Femora of uniform thickness throughout; tibiæ hardly irregularly thickened; anterior cross-vein at about the middle of the discal cell; basal segment of abdomen only slightly, or not at all, narrowed	CONOPS L.

Genus **CONOPS**, *L.*

Conops, Linnæus, Fauna Sueciæ, p. 1907 (1761).
Conopæus, Rondani, Mag. de Zool. pl. 153, fig. 2 (1845).
Sphixosoma, Rondani, Dipt. Ital. Prod. ii, p. 223 (1857).

GENOTYPE, *Conops flavipes*, L.; by designation of Curtis.

Head large, broader than thorax, bare, loosely attached by a narrow neck; epistome perpendicular or slightly receding, descending at sides considerably below level of eyes; eyes bare, wide apart in both sexes, vertex with a transverse vesiculose tubercle; ocelli absent; proboscis elongate, cylindrical, much longer than head, generally horizontal, bent at base; labella small and narrow. *Thorax* subquadrate, bare, often with well-defined yellow spots, especially on the humeri, on the posterior corners of the dorsum and near the bases of the wings; scutellum semicircular. *Abdomen* elongate, cylindrical, 6-segmented, generally slightly curved downwards; base usually slightly narrowed, tip more or less clubbed. Genitalia in ♂ small, thread-like, scarcely prominent. In the ♀ the genitalia comprise a large, obtusely conical piece with apical appendages, and are furnished with a large, curved, shield-like organ, which is produced from the 5th segment, but which (when the 4th segment is very short, as is often the case) appears to belong to the 4th segment. This shield-like organ is often present in the ♂ also, but is always comparatively small in that sex. *Legs* comparatively strong, moderately long, practically bare, having at most a little soft pubescence in certain species; hind femora generally slightly longer and thicker than the others. *Wings* with the venation typical of the family; 1st posterior cell closed a little before the margin; anterior cross-vein at about middle of discal cell and situated almost opposite, or just before, the tip of the auxiliary vein; 2nd basal cell less than half as long as the 1st; anal cell long and narrow, closed distinctly before margin of wing.

Range. World-wide.

Life-history: see under heading of the family.

Conops is one of the earliest founded genera in Diptera, and is soon recognised by the collector by its wasp-like appearance, its long, rigid proboscis and antennæ, and its peculiar venation. The species are of moderate size or even comparatively large. They usually exhibit a brown or black ground-colour marked with yellow or reddish spots and bands. The adult flies occur on flowers and in sunny spots, and are generally distributed. The species are sometimes closely allied and difficult satisfactorily to tabulate, and some little knowledge of the family is required to identify them with certainty.

Table of Species.

1. Wings quite clear . . *claripennis*, sp. n.,
   Wings never clear . . . . . 2. [p. 345.
2. (*a*) Thorax and abdomen wholly black; at most traces of whitish stripes on anterior margin of former, and humeri pale (*erythrocephalus*); or with golden-grey pubescent abdominal bands (*pactyas*); or with hind margins of 2nd and 3rd abdominal segments grey-dusted . . . . 3.
   (*b*) Thorax wholly orange-brown, abdomen entirely black with obvious black pubescence, much more conspicuous than is usual in *Conops* . . . . [p. 346. *nigriventris*, sp. n.,
   (*c*) Thorax and abdomen having the facies normal to *Conops*; ground-colour mainly brown or orange (mainly black in *annulosus*), with yellowish, whitish or blackish markings . . . . . 4.
3. (*a*) Wings abnormally broad, wholly black; body violet-black; abdomen barely narrowed at base; pulvilli and claws orange . . . . . [p. 347. *erythrocephalus*, F.,
   (*b*) Wings of normal width, dark grey; body dull black; abdomen much narrowed (for that of a *Conops*) just beyond base; pulvilli and claws black; 2nd and 3rd abdominal segments grey-dusted . . . . . [p. 348. *sepulchralis*, Brun.,
   (*c*) Wings of normal width, grey with anterior half much darker; abdomen with golden-grey dust-bands on hind margins of 1st and 2nd segments in ♂ and ♀, and also on 3rd and 4th in ♂ . . . . . *pactyas*, Walk., p. 349.
4. Thorax with 3 stripes . . . . . *ornatus*, Big., p. 350.
   Thorax never striped. . . . . 5.
5. A pair of black dots on frons at the level of the antennæ . . . . . 6.
   Such spots always absent. . . . . 7.

6. Antennæ brownish-orange, especially the 3rd joint; abdomen without any black colour (except sporadically in individuals); basal half of wing yellowish, distal part grey or pale blackish, the colours divided vertically, always with a fairly obvious, large, darker, subapical cloud ... *nubeculosus*, Big., [p. 350.

Antennæ wholly black; abdomen mainly black, hind margins of segments dusted with golden-yellow in ♂, reddish-orange on 2nd to 5th segments in ♀; wings dark brown from costa to 3rd vein, with 1st posterior cell more or less brown, the line separating the shades being horizontal . ... *annulosus*, Big., p. 352.

7. Antennæ orange or yellowish; metanotum brownish-orange, yellow-dusted; anterior half of wing pale brownish or blackish; abdomen without red ground-colour *intermedius*, sp. n., [p. 353.

Antennæ almost wholly black; metanotum wholly black; anterior half of wing dark brown to 3rd vein, also 1st posterior cell; hind margins and sides of 3rd and 4th abdominal segments distinctly red *rufofasciatus*, sp. n., [p. 353.

C. testaceus, Macq., though Indian, is excluded from the table because the description of it is very incomplete. Judging from the description this species should fall into section 6, but actually it may be a *Physocephala*.

268. **Conops claripennis**, sp. nov.

♂ ♀ *Head* entirely pale yellow, almost livid on vertex, more whitish on lower part of face, with a small black dot on each side of the frons, not quite contiguous to the eye-margin, and situated a little above the level of the antennæ. When the head is viewed from above, a shining, pale gold, clear-cut band is visible, extending down each side of frons and face. Antennæ brownish-orange, 2nd joint a little darker, also tip of 3rd, all joints subequal. Proboscis brown, darker at base and tip; occiput wholly pale yellow. *Thorax* with ground-colour entirely orange-brown, more or less dusted with whitish, dorsum to some extent blackish, leaving humeri, scutellum and sides indefinitely orange-brown. Pleuræ with a little whitish shimmer when seen from above. *Abdomen*: 2nd and 3rd segments mainly dark reddish-brown, rest of abdomen blackish; 1st, 2nd and 3rd segments, and hind margins of all the segments, indefinitely dusted with whitish; 1st segment with a little moderately long, stiff, black pubescence at sides. *Legs*: coxæ dusted with silvery-white; femora wholly orange-brown; tibiæ orange-brown, with about basal half lemon-yellow, and outer side with a silvery-white shimmer in certain lights; tarsi black, with an indefinite pale streak on upper side at base of anterior metatarsi; pulvilli and claws pale yellow, tips of

latter black. *Wings* practically clear; anterior cross-vein almost exactly opposite tip of auxiliary vein and at middle of discal cell. A narrow greyish streak, having the appearance of the "vena spuria" in SYRPHIDÆ, runs from the anterior cross-vein nearly to the tip of the discal cell. Halteres pale yellow.

Length, 6–8 mm.

Described from 8 ♂ ♂ and 2 ♀ ♀ in the British Museum and in Col. Nurse's collection. Quetta, vi. 1902; vii. 1902; Deesa, vii & xi. 1901; ii. 1900; xi. 1899 (*type* ♀); xii. 1899 (*type* ♂) (all *Nurse*). *Types* in British Museum. Easily distinguished from all the other species by the wholly clear wings.

Var. **ceylonicus**, nov.

Centre of frons irregularly blackish, the small black lateral dots more distinct. Dorsum of abdomen black, sides with traces of dark brown; abdomen distinctly more contracted basally in ♂ than in ♀; 2nd and 3rd segments in ♂ with a yellow-dusted band; tip of abdomen yellow-dusted in ♂, grey-dusted in ♀. Tibiæ a little blackish towards tips. Wings darker grey, otherwise the apparent "spurious" vein and other characters are as in the normal form.

Length, $7\frac{1}{2}$–10 mm.

One ♂ and one ♀, Perivipancheram, Ceylon, 21. i. 1892 ("a few on hillside," *Yerbury*). In the British Museum. Though these specimens are of considerably larger size, I am loth to regard them as specifically distinct. The peculiar black spots on the frons are a feature linking them to the normal form.

269. **Conops nigriventris**, sp. nov.

♂ *Head* orange-brown; vertex occupied by a large, nearly livid spot extending some distance over occiput; a space above base of antennæ is almost raspberry-red, and this colour is sometimes continued down each side of the face; whole lower part of head, seen from above, with shining pale golden reflections. Antennæ moderately dark orange-brown, 2nd joint twice as long as 1st, 3rd joint vivid deep orange; proboscis black, brownish-orange at base. Occiput brownish-yellow, except where the vertical livid spot extends over it; it has a little short black pubescence. *Thorax* orange-brown, scutellum a little paler, both with very short, rather sparse, bristly, black pubescence; humeri obscurely yellowish; some stronger bristles on side margins of dorsum between humeri and wing-base. Pleuræ concolorous, bare, except for several fairly strong bristles on sternopleura. *Abdomen* elongate club-shaped; after the transverse 1st segment, it widens gradually from the base of the second segment to the tip of the 3rd, thence gradually narrows to the obtusely rounded apex. 2nd to 6th segments subequal, and (with 1st also) wholly black; all entirely covered with uniform, quite obvious, black pubescence. Genitalia brownish-orange, the shield comparatively

small, black. *Legs* orange-brown; coxæ with shining, pale gold reflections and with rather strong, though medium-sized, black bristles; hind femora indistinctly blackish on inner side; tarsi black, pulvilli and claws orange-yellow, tips of latter black; tibiæ, seen from above, with a whitish shimmer on outer side. Pubescence of legs short, black, bristly, much denser towards tips of tibiæ. *Wings* pale yellowish-grey; rather dark yellowish-brown from anterior margin to 4th vein, this colour extending to wing-tip and indefinitely hindwards; 5th and 6th veins very narrowly infuscated with yellowish-brown; squamæ and halteres orange-yellow.

Length, 13–14 mm.

Described from 2 ♂♂ in British Museum from the Khasi Hills, Assam (*Sladen*). The appearance of this species is rather abnormal, on account of the contrast of the wholly black and pubescent abdomen with the orange-brown thorax.

270. Conops erythrocephalus, *Fabr.*

Conops erythrocephala, Fabricius, Ent. Syst. iv, p. 392 (1794); Wiedemann, Auss. Zweifl. ii, p. 235 (1830); Macquart, Dipt. Exot. ii, pt. 3, p. 9, pl. i, fig. 7 (1843).

♂ ♀ *Head* orange or orange-yellow with silvery-white reflections; lower part of frons, antennal prominence and antennæ, black or blackish; proboscis with basal half reddish-brown, apical half black; a small conspicuous round black spot on each side of frons at level of antennæ, contiguous to eye-margin;

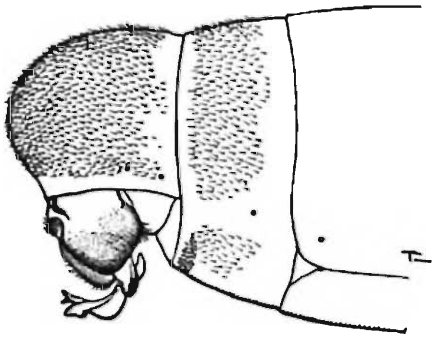

Fig. 73.—*Conops erythrocephalus*, F., ♂ genitalia.

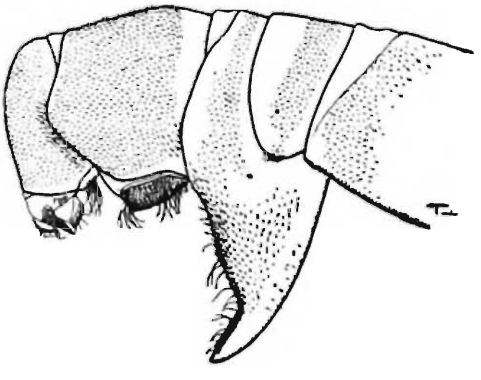

Fig. 74.—*Conops erythrocephalus*, F., ♀ genitalia.

occiput orange with whitish reflections. *Thorax* black, with white-dusted dorsum; humeri dull orange with whitish reflections; pleuræ black with general silvery-white reflections and a broad silvery-white stripe from behind humeri to middle coxæ. *Abdomen* violet-black, last segment in ♂ white-dusted; genitalia concolorous, genital shield in ♀ very large, black. *Legs* black or dark brown; coxæ with more or less whitish reflections; anterior femora reddish-brown or orange-brown, except narrowly at tips; tarsi in certain lights seen to be covered with moderately dark

brown pubescence. *Wings* wholly blackish-brown, violet-tinged, slightly paler posteriorly; halteres relatively small, black.

Length, 10–15 mm.

Described from a long series of both sexes from Pusa, Bengal; 20. iv. 1905; 1. viii. 1907 (on rice); 21. ix. 1907; and from Chapra, Bengal (*Mackenzie*); common in both these localities in September. Deesa (*Nurse*). Colombo (*Yerbury*). Lashio, Upper Burma, 3000 ft., 23–24. viii. 1914 (*Fletcher*). The locality appended to the original description was simply "India orientalis." A striking species, from its practically wholly black colour and very broad black wings.

271. **Conops sepulchralis**, *Brun.*

Physocephala sepulchralis, Brunetti, Rec. Ind. Mus. vii, p. 498 (1912).

♂. *Head* wholly black except the face and under side, which are bright chrome-yellow, the colours sharply delineated in a line across the base of the antennæ. The extreme under side of the head, below the eyes, and the mouth and the proboscis are black, the proboscis extending barely beyond the epistoma. Antennæ entirely black; 2nd joint two-and-a-half times as long as 1st; 3rd elongate, with a 2-jointed style, the first joint cup-shaped, the second pointed; the 3rd antennal joint together with its style is about two-thirds as long as the 2nd joint; seen from in front and below, the 3rd joint is a little greyish on the inner side. There is a very dull, dirty yellow, subtubercular oval area, most obvious from behind, on the vertex. *Thorax* with scutellum,

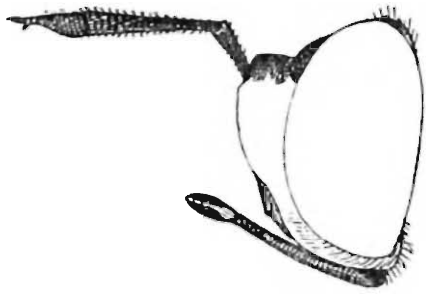

Fig. 75.— *Conops sepulchralis*, Brun., profile of head.

metanotum and sides, wholly black. *Abdomen* wholly black; 1st segment with a few stiff black hairs at the sides; 2nd segment distinctly contracted (about half as wide as the 3rd and 4th segments), dull yellowish-brown on hind margin and a little grey-dusted at the sides; 3rd segment with hind margin barely whitened, and with a little grey dust at the sides behind; remainder of abdomen black, bare; genital organs small, black. *Legs* very dark reddish-brown, nearly black; coxæ black; hind pair, seen from behind, brilliantly shining silvery-white; the silvery-white colour extends to a considerable degree across the posterior part of the metasternum; anterior coxæ silvered to a less extent; femora with a broad black median ring filling two-

thirds of their length, the middle pair with distinct but short black hairs behind; tibiæ flattened behind at the tips, where they exhibit silvery reflections when viewed from above; tarsi black, pulvilli grey below. *Wings* dark grey; anterior part from costa to 3rd longitudinal vein more or less darker brown, varying in intensity in different parts; halteres yellowish-orange.

Length, 14 mm.

Described from one ♂ (*not* ♀) from the Lushai Hills, Assam (3600 ft.), 14. iv. (? 1909). In the Indian Museum.

Though originally described under the genus *Physocephala*, this species is probably better referred to *Conops*, on account of the entire absence of any thickening of the hind femora, and the position of the anterior cross-vein at the middle of the discal cell. The strong basal contraction of the abdomen is a character of *Physocephala*, but one which is, I think, of minor importance, and the species may be considered as to some extent intermediate between the two genera.

272. **Conops pactyas**, *Walk.*

Conops pactyas, Walker, Ins. Saund., Dipt. pt. iv, p. 255 (1852).

♂ ♀ *Head*: frons black, a little reddish-brown above the black antennal prominence; eye-margins narrowly gilded; face and lower part of head orange, with (seen from above) golden-grey reflections; proboscis black, nearly twice as long as head; antennæ black, a short orange streak on apical half of under side of 3rd joint; occiput orange-yellow, mainly black in centre. *Thorax* wholly black, slightly dusted with golden-yellow on hind margin of dorsum and hinder side of metanotum; metapleuræ dusted with yellowish-grey. *Abdomen* black; a broad golden dust-band on hinder half of 1st and 2nd segments, on 3rd and 4th also in ♂; 5th in ♂ considerably dusted with golden-yellow; 6th segment reddish-brown at tip and grey-dusted; genital shield very large and long, front side reddish-brown, inner side black. *Legs*: coxæ black with whitish reflections; hinder side of hind pair reddish-brown; femora either orange-brown (type) or black, in the latter case with about apical half of hind pair and greater part of under side of all pairs, orange-brown; tibiæ brownish-orange, a little darker towards tips, with brilliant silvery reflections on outer side; anterior tarsi black, hind pair dark brown; pulvilli and claws bright yellow, extreme tips of latter black. *Wings* grey, anteriorly moderately dark blackish-brown, this colour being delimited posteriorly by the 3rd vein, but including the 1st posterior cell except its hinder side; halteres dark brown.

Length, 13 mm.

Redescribed from the *type* ♀ from Java in the British Museum and a second ♀ from Lashio, Upper Burma, 3000 ft., 23–24. viii. 1914 (*Fletcher*). The femora of the latter example are much more blackish than those of the type, and the outer sides

of its discal and 1st posterior cells are more nearly in a line. A ♂ in the British Museum from Darjiling, iv. 1901 (*Bingham*), is almost certainly of this species and possesses golden dust-bands on the 3rd and 4th segments. There is also a ♀ from the Khasi Hills in the British Museum, and a ♀ in the Indian Museum from Talewadi, near Castle Rock, N. Kanara District, 3–10. x. 1916 (*Kemp*).

273. **Conops ornatus**, *Big.*

Conops ornatus, Bigot, Bull. Soc. Zool. France, xvii, p. 211 (1892).

"♀ Long. 15 mill. Antennæ reddish, last segment a little paler; proboscis blackish; face reddish with pale shining yellow reflections; two small black spots on frons near eye-margins. Thorax reddish, disc with three broad blackish stripes; scutellum reddish; pleuræ concolorous, with some silvery dust reflections; halteres pale tawny. 1st segment of abdomen blackish; 2nd moderately broad, elongate, reddish; 3rd and 4th blackish, narrowly bordered with reddish; the rest reddish, but the 5th and 6th in the middle at the base blackish; the last three segments with golden-yellow dust reflections on each side. Legs reddish, tips of tibiæ broadly, and tarsi wholly, blackish; outer side of all tibiæ with brilliant silvery reflections. Wings wholly pale tawny, tip broadly suffused with blackish. Vertex and frons not at all inflated; proboscis much longer than head; femora not at all thickened.

"Two specimens, Mahé, India (*M. Em. Deschamps*)."

Judging from this description, and particularly from the mention of the two black spots on the frons, this species might almost be identical with Bigot's *nubeculosus*, but the three broad blackish stripes on the thorax should be a good distinguishing character, and the insect is also decidedly larger.

274. **Conops nubeculosus**, *Big.* (Pl. VI, fig. 9.)

Conops nubeculosus, Bigot, Ann. Soc. Ent. France, (6) vii, p. 36 (1887).

♂ ♀. *Head*: vertex, frons, antennal prominence and occiput bright brownish-yellow; face and rest of lower part of head bright pale, almost golden, yellow, with a vivid yellow, pale yellow or yellowish-white shimmer when seen from above; the colours of the frons and face are sharply delimited at the level of the antennæ (when viewed from above), at which point on each side, contiguous to the eye-margin, is a small, very distinct, round, jet-black spot. Mouth-opening more or less brownish-yellow; proboscis when not extended about 1½ times length of head, brownish-yellow or reddish-brown, with basal half and tip black. Antennæ brownish-yellow or yellowish-brown, 3rd joint orange with concolorous 2-jointed style, extreme length of joint nearly as long as

that of the 2nd; the 2nd joint has minute black brlstles. Inner orbit of eyes with extremely narrow golden-yellow or yellowish-white margins, margin of occiput of similar colour. *Thorax* reddish-brown with whitish reflections in certain lights; a little yellowish or whitish dust or a whitish reflection on inner sides of humeri, posterior corners of dorsum, base of wing, upper part of metanotum and, indistinctly, over pleuræ; metanotum generally blackish behind. *Abdomen* yellowish-brown or reddish-brown, only slightly narrowed at base; 1st segment with yellowish-white dust; 2nd with golden-yellow dust at sides; 3rd and 4th subequal in length, nearly wholly brown with a more or less blackish patch in the middle, or sometimes with an irregular blackish basal and subapical band; 5th segment very short, 6th longest of all, both normally covered with golden-yellow dust, but the 5th is sometimes brownish at the base. There are some tiny black bristles on sides of 1st segment, on sides of 2nd at base, and on sides (at base) of 4th, 5th and 6th segments. Venter uniformly brownish-yellow. Genitalia in ♂ normal; in ♀ the large concolorous shield-like organ on the under side of the 5th segment is black and apparently ribbed on the inside, and bears long fine hairs; ovipositor large, oval, shining, concolorous, with minute black bristles, the 2nd joint very small, with small appendages and black hair. *Legs* bright orange-brown, with minute black bristles; coxæ with golden-yellow or yellowish-white reflections; outer sides of all the tibiæ and dorsal side of hind tarsi with a very bright, yellowish-white, shimmer; anterior tarsi wholly black from base to tip, hind tarsi brown below; pulvilli and claws yellowish-white. *Wings* yellowish; about the distal third is to a very variable extent and intensity brownish, this coloration sometimes forming an almost definite large spot, at others barely darkening the wing; the brown colour sometimes extends over the hinder part of the wing; in some specimens the whole of the wing is almost uniformly dark brown. Halteres yellow or brownish-yellow.

Length, 9–14 mm.

Type in the Bigot collection, from Ceylon.

Redescribed from about thirty specimens in good condition, and agreeing closely with the type, from Pusa; 30. viii. 1907; on grass, 29. ix. 1907; 6. x. 1915; Chapra, Bengal (*Mackenzie*); Rangoon, vi. 1897 (*Bingham*), a typical ♀ A specimen in the Pusa collection from Pusa (ix. 1907) has the wings quite clear, with a short appendix on the inner side of the outer margin of the discal cell, and the 3rd antennal joint is as long as in *intermedius*. In all other respects, except that the golden abdominal bands are not quite so conspicuous, it resembles the typical form. Another specimen (♂, in the British Museum) from Harigalli, Ceylon, 2. vii. 1892 (*Yerbury*), has the wings entirely rather dark brown, but it agrees in all the other specific characters with the typical form, and it has just a trace of the subapical darker cloud on the wing.

275. Conops annulosus, *Big.*

Conops annulosus, Bigot, Ann. Soc. Ent. France, (6) vii, p. 36 (1887).

♂ ♀. *Head* varying from brown to orange-yellow; vertex and frons generally dark brownish-orange or deep brown; face with glistening silky golden sheen when viewed from above. Antennæ wholly black (1st joint dark brown and 3rd joint orange at base in type); a black dot on each side of frons, as in *nubeculosus*. Proboscis entirely black. Occiput blackish, with golden-yellow margins; brownish-orange behind vertex, and often with a transverse band of bright golden-yellow dust in the same region. *Thorax*: dorsum black; humeri and hind corners brownish-orange; there is a small golden-yellow dust-spot on each side behind the anterior margin and contiguous to the humerus, and the inner hind corners of these spots are more or less quadrate; the brownish-orange colour of the dorsal posterior corners is continued for a short distance along each side towards the base of the wing. Pleuræ more or less blackish, with a little whitish dust present, but not forming a vertical stripe. Scutellum brownish-orange; metanotum rather shining black, its upper margin appearing gold-dusted when seen from behind. *Abdomen* black; in ♂, 1st segment with somewhat bristly black hair at sides, hind margin indistinctly pale yellowish; 2nd to 5th segments broadly dusted with bright yellow on hind margins, the bands being variable in width, but generally broadest on 2nd and 3rd segments and more clearly defined there; 6th segment entirely yellow-dusted, except that it is narrowly black on the anterior margin. In ♀, the yellow dust-bands are broad and distinct on 2nd and 3rd segments, less so on 4th; the ground-colour of 2nd, 3rd and 4th segments (viewed from behind) is distinctly red, while the golden dust-bands are sometimes visible only in front. *Legs* brownish-orange; coxæ white-dusted; hind femora a little blackish at base; tibiæ with a white shimmer; tarsi black, often brownish-orange above at base; pulvilli and claws orange-yellow, tips of latter black. Pubescence of legs inconspicuous, black, short, bristly. *Wings* grey; from costa hindwards to 3rd vein dark brown, the 1st posterior cell also is brown down to an apparent "spurious vein"; halteres bright yellow.

Length, 10–12 mm.

Redescribed from the *type* ♂ (which is labelled as a ♀) from the Moluccas in the Bigot collection; three ♂ ♂ and one ♀ from Simla, viii–ix. 1898 (*Nurse*); and a specimen from the Khasi Hills (*Sladen*), all in the British Museum. In this and one or two allied species there is a fold in the wing, slightly darkened, which produces the same appearances as does the "spurious vein" in SYRPHIDÆ.

276. Conops intermedius, sp. nov.

♂. Very like *nubeculosus* but quite distinct. The two black spots on the frons, so conspicuous in that species, are absent and there is usually a blackish thin median stripe on the frons from the vesicular vertex to the actual base of the antennæ. Proboscis $1\frac{1}{2}$ to $1\frac{3}{4}$ times as long as head, with only the extreme tip and occasionally a short streak on upper side at base, black. 3rd antennal joint (with style) nearly as long as 2nd, distinctly longer in proportion than in *nubeculosus*. Pleuræ with a vertical, pale golden-yellow or yellowish-white, distinct, rather broad stripe extending from just behind humerus to a point in front of middle coxa. Hind part of metanotum concolorous, never black. Abdomen with 2nd segment almost entirely gold-dusted, excepting at the base and along the median line to about the middle of the segment; 3rd and 4th segments with posterior half to three-fourths or more, gold-dusted, the brown ground-colour extending along the median line to a variable distance. The brownish colour in the wings takes the form of a longitudinal darkening to the extent of about half the wing's length, rather than that of an indefinite distal spot.

In all else as in *nubeculosus*. The absence of the black frontal spots and the presence of the white stripes on the pleuræ are the primary characters of differentiation; the secondary ones being the black frontal stripe, the almost entirely red proboscis, the entire absence of black on the metanotum and the different distribution of gold dust on the abdomen.

Length, 9–11 mm.

Described from a few ♂ ♂ from Pusa, 23. iii. 1914; 27. iii. 1908; 18. iv. 1905; ix. 1907 (*type*); Chapra (*Mackenzie*). *Type* sent to the British Museum by Mr. T. B. Fletcher; cotypes in the Indian Museum and my collection. This species is in appearance intermediate between *C. nubeculosus*, Big., and *Physocephala aurantiaca*, sp. nov. It also considerably resembles *Physocephala munda*, Brun. The 3rd antennal joint is distinctly longer in *C. intermedius*; the sides of the face are gilded, not silvery; the femora, even the hind pair, are not in the least incrassated; the basal abdominal segments, even in the ♂, are much wider than those of *P. munda* ♀; and the anterior darkening of the wing extends to the tip of the 3rd vein, being delimited hindwards by this vein, and filling about the anterior half of the 1st posterior cell, or sometimes the whole of it, and (more distinctly) the discal cell, the colour fading away gradually hindwards. In *P. munda* the colour ends distally at the tip of the 2nd vein and does not encroach on the 1st posterior cell. *C. intermedius* is altogether a more robust insect.

277 **Conops rufofasciatus**, sp. nov.

♂ ♀ *Head* above antennæ brownish-orange, horizontally wrinkled; face pale yellow, shimmering golden when seen from

above. Antennæ with 1st and 2nd joints black; 2nd about 1½ times as long as 1st; 3rd (to tip of style) as long as 2nd; dull reddish-orange, black above; style black, distinctly 3-jointed, 1st and 2nd joints thick, annular, 2nd a little larger than 1st, 3rd pointed. Proboscis black, reaching the level of the tip of the 2nd antennal joint. Occiput brownish-orange, with inconspicuous black pubescence, paler behind vertex, with some whitish reflections. *Thorax* black, with traces of whitish stripes on anterior margin; humeri and broad side margins brownish-orange; scutellum brownish-orange, base considerably blackened; pleuræ black, with an indefinite whitish shimmer when seen from above; metanotum black. *Abdomen* black; sides of 3rd and 4th segments rather broadly, and their hind margins (also that of 5th) narrowly, reddish or brownish-orange; tip of abdomen rather reddish in ♂, the reddish colour probably variable in extent; 5th segment very narrow above in ♀. Pubescence black, very short, longer on 1st segment. *Legs* rather dark brownish-orange; coxæ mainly black, except on lower part of fore pair, the front side of which is glistening white when seen from above; femora black on more than basal half; tibiæ a little blackish at tips and glistening white on outer side; tarsi black, pulvilli yellowish-white, claws brownish-orange with tips black. *Wings* grey, with rather dark blackish-brown coloration from the anterior margin down to the 3rd vein, and also filling the 1st posterior cell and thence extending towards the margin of the wing; halteres orange-yellow.

Length, 10–11 mm.

Described from a ♂ and ♀ in the British Museum from Simla, viii-ix. 1898 (*Nurse*). The reddish-brown ground-colour of the abdominal segments is the principal distinctive character of this species, which may be recognised rather easily after some acquaintance with the Oriental members of the genus has been obtained.

278. **Conops testaceus**, *Macq.*

Conops testacea, Macquart, Dipt. Exot. ii, pt. 3, p. 9 (1843).

"Testaceous, costal margin of wing with a short brown band. Long. 4–4½ lines, ♀

"Face yellow, tawny at sides; frons, vertex and antennæ tawny, 3rd joint of latter rather short, tip blackish. Thorax testaceous, metathorax with grey dust. Abdomen: first five segments with yellow or whitish hind margins; the three first testaceous; 3rd with a brown spot on each side before the tip; 4th and 5th blackish above; 6th yellow or whitish. Legs tawny, anterior coxæ blackish in front; tibiæ with basal half yellow. Wings with a brown costal band which widens and ends abruptly at the tip of the marginal cell.

"One specimen, Bengal (*M. Duvaucel*); one specimen, Pondicherry. In the Paris Museum."

This description agrees to some extent with that of my *intermedius*, except for the rather short 3rd antennal joint, which is

longer in *intermedius* than in any Indian species known to me. The abrupt termination of the dark band on the wing, however, is more characteristic of *Physocephala* than of *Conops*.

Genus **PHYSOCEPHALA**, *Sch.*

Physocephala, Schiner, Wien. Ent. Monatschr. v, p. 137 (1861)

GENOTYPE, *Conops rufipes*, Fabr.; by original designation.

Though forming a natural group by a combination of characters, *Physocephala* is undoubtedly very closely akin to *Conops*, and a certain number of species, even when valued by all the characters combined, may be said to be intermediate. Probably

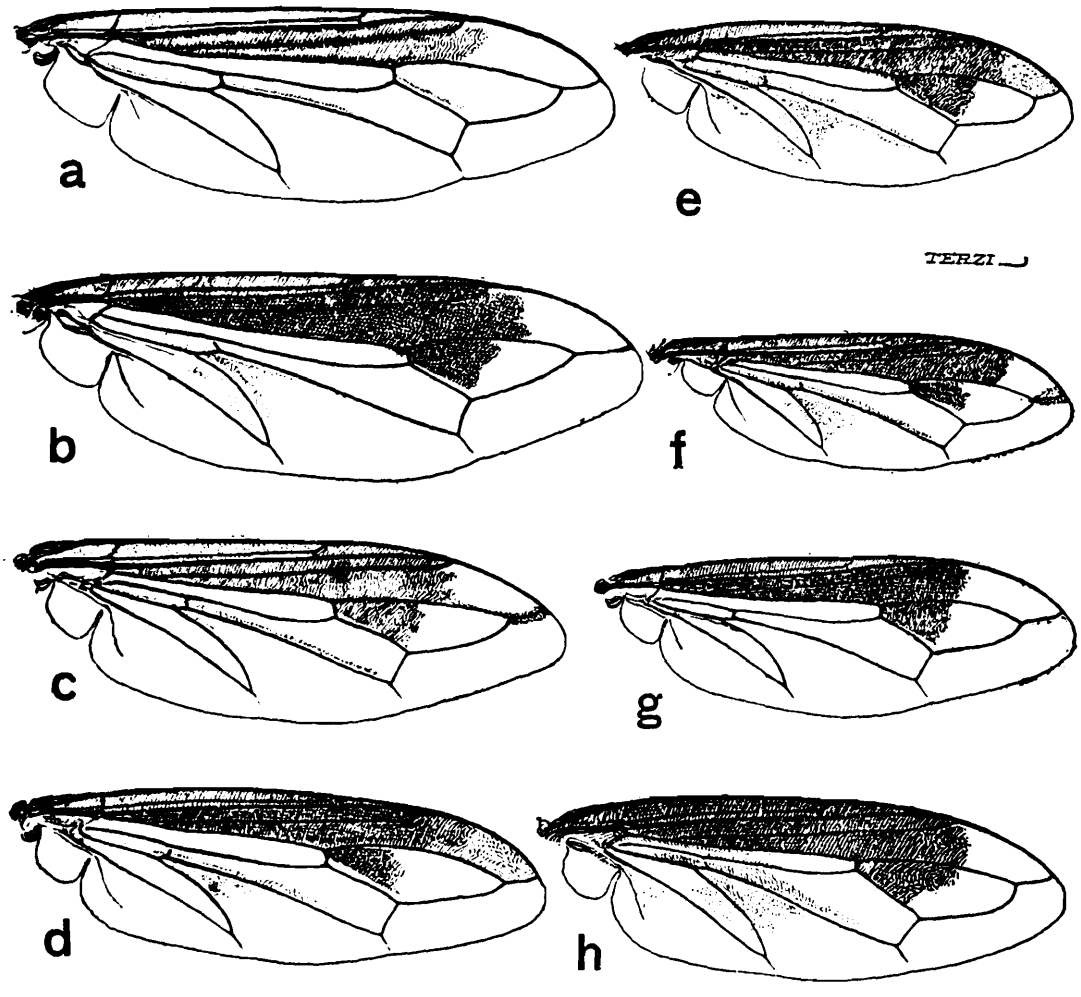

Fig. 76.—Wings of *Physocephala*.

a, *P. munda*, Brun., ♂
b, *P. aurantiaca*, sp. nov., ♀.
c, *P. nursei*, sp. nov., ♂.
d, *P. argentifera*, sp. nov., ♀.
e, *P. diffusa*, sp. nov., var.
f, *P. diffusa*, normal form.
g, *P. tenella*, Big., var.
h, *P. tenella*, normal form.

the best single means of differentiation lies in the structure of the femora, which in *Conops* are usually of uniform thickness throughout, or at most thickened gradually and regularly, but which in *Physocephala* are (particularly the hind pair) thickened

irregularly and suddenly towards the base. Secondary but fairly constant characters are: the greater narrowness of the basal part of the abdomen, especially of the 2nd and 3rd segments, which are often considerably elongated and cause the abdomen to resemble that of a wasp; the proportionately greater length of the 2nd antennal joint, which is often much longer than the 1st and 3rd together; and the position of the anterior cross-vein, which is nearly always placed well beyond the middle of the discal cell. All the other features are plastic, and vary in different species independently of one another. *Conops sepulchralis* and *Physocephala munda* are species more or less intermediate between the two genera.

Range. Practically world-wide.

Life-history: see under heading of family, p. 342.

Turning to the differentiation of species, this genus has offered as many difficulties as have been encountered in any case dealt with in the present volume. Owing to the variability of every available character, except perhaps that of the incrassation of the hind femora, it has been impossible, even with all the species before me at once, to frame any table of species that would cover all the individual forms. Wide allowances must therefore be made on these grounds: and the identification of a single specimen of any one of the closely-allied species is often quite impracticable, even to anyone fairly conversant with the genus, unless authoritatively named specimens in good condition are available for comparison.

Table of Species.

1.	Wing with dark band extending to tip of 3rd vein, even if fainter or nearly absent just before its end	2.
	Wing with dark band ending at tip of 2nd vein or at a short distance beyond it, always at some distance from tip of 3rd vein	7.
2.	First basal cell brown; basal half of 1st posterior cell brown; discal cell with its base and part of its front and hind sides, brown	3.
	First basal cell clear; basal half of 1st posterior cell brown; (discal cell may be slightly suffused at base)	6.
3.	Hind femora always with a broad black band	*bicolor*, sp. n., p. 357.
	All femora wholly orange	4.
4.	Discal cell wholly brown	*aurantiaca*, sp. n., [p. 358.
	Discal cell clear	5.
5.	Third abdominal segment entirely orange-brown (at most the extreme hind margin is blackish)	*nigrofasciata*, Brun., [p. 359.
	Third abdominal segment about equally divided into red-brown, black, and gold-dusted portions	*rufescens*, sp. n., p. 360.

6.	Wing-band dying away gradually at tip; apical segment of 3rd vein distinctly suffused; thorax with three short blackish stripes, nearly contiguous. Length 14 mm.	*nursei*, sp. n., p. 360.
	Wing-band continuing dark brown to tip of 3rd vein; thorax with a median blackish stripe, sometimes indistinct or absent. Length 8–10 mm. . .	[p. 361. *argentifera*, sp. n.,
7.	Wing-band dying away gradually at about tip of 2nd vein	*munda*, Brun., p. 361.
	Wing-band ending truncately, generally clearly demarcated	8.
8.	Fourth and 5th veins not basally infuscated, nor the intervening space	9.
	Either 4th or 5th vein infuscated, or both, or the intervening space . .	11.
9.	Antennæ wholly black .	*atricornis*, sp. n., p. 363.
	Antennæ mainly orange or brown.	10. [p. 363.
10.	Thorax wholly black .	*annulifera*, Brun.,
	Thorax brownish-yellow or orange-brown .	*calopus*, Big., p. 364.
11.	Hind femora wholly orange	*diffusa*, sp. n., p. 365.
	Hind femora with a broad median black ring. .	*tenella*, Big., p. 366.

279. **Physocephala bicolor**, sp. nov. (Pl. VI, fig. 10.)

♂ ♀ *Head* varying from rather pale yellow to orange-yellow; vertex sometimes wholly black, the colour extending in the middle irregularly forward nearly to base of antennæ, or carried downwards for a short distance on each side of face; sometimes the vertex and upper part of the frons only are more or less brownish. There is a narrow, black, distinct stripe on the face just below the antennæ; the latter are dark brown or black, 3rd joint more or less reddish or orange on basal half below, sometimes 2nd and 3rd joints almost wholly reddish below; 2nd joint $2\frac{1}{2}$ to 3 times as long as 1st, 3rd joint (apart from style) more than half as long as 2nd; style three-jointed, with second joint produced on inner side and 3rd joint small, thus causing the antennæ to appear as if bisected at the tip. Occiput, mouth-opening and lower part of head black or dark brown, also the proboscis, which is fully double the length of the head. *Thorax*: dorsum mainly black, punctate, with very tiny black bristles; side margins, humeri and scutellum distinctly, and hind margin and posterior corners less distinctly, brownish-orange; pleuræ black, except that the parts below the humeri and behind the wing-base, also an exceedingly narrow vertical stripe immediately below the wing-base, are brownish-orange; metanotum black, upper edge often more or less orange. There are some indefinite whitish reflections on pleuræ. *Abdomen*: 1st segment black; 2nd brownish-orange, more or less broadly blackish in middle; 3rd black, rather narrowly brownish-orange at base and on hind margin; 4th and 5th mainly black, 4th more or less broadly behind, and 5th more narrowly, dull orange; 6th generally similar to 5th. On 2nd, 3rd, 4th and 5th

segments there is a whitish reflection on the extreme hind margin, varying in width and distinctness. Pubescence of abdomen consisting of short bristly black hairs, uniformly distributed. Pale colour in abdomen sometimes almost reddish. *Legs* orange-brown, varying a little; coxæ black, with whitish, sometimes silvery, reflections. At least hind femora always with a broad black median ring; similar, though generally less conspicuous or interrupted, bands are sometimes present on either fore or middle legs, or on both; in some specimens the dark bands are quite absent. Tarsi a little darker. *Wings* grey; anterior half blackish-brown, the colour limited hindwards by a narrow streak along the hinder side of the discal cell, filling only the basal half of that cell, the basal half of the 1st posterior cell and the anterior part of the distal half of that cell, and ending on the wing-margin at the tip of the 3rd vein. Halteres yellow.

Length, 15 mm.

Described from 5 ♂♂ and 2 ♀♀ in the British and Indian Museum collections. Seudim Spur, Sitong, Darjiling District, 4600 ft., 22–28. x. 1917 (*Annandale & Gravely*), *type* ♂; Sureil, Darjiling District, 5000 ft., iv–v. 1917 (*Kemp*); Kousanie, Kumaon District, W. Himalayas, 6075 ft., 24. vii. 1914, *type* ♀; Simla, viii–ix. 1898 (*Nurse*); Nepal; Khasi Hills, 1878 (*Chennell*); Cherrapunji, Khasi Hills, 3000–5000 ft., 16. v. 1905. *Types* in Indian Museum.

A species very well marked by its almost wholly black and "red" coloration and the broad black band which is always present on the hind femora, though it may be present or absent on the other legs.

280. **Physocephala aurantiaca**, sp. nov.

♂ ♀. *Head* wholly orange, sometimes a little darker on lower part of frons and antennal prominence; mouth-opening more or less pale yellow; proboscis 1½ times as long as head, bright shining brown, tip black. Antennæ yellowish-brown, 3rd joint sometimes bright reddish-orange, two-thirds as long as 2nd joint (measured along the under side, which is much longer than the upper). Occiput orange, margin with bright golden-yellow shimmer. *Thorax* wholly bright brown, dorsum more or less blackish; humeral region, posterior margin of dorsum and metapleura with conspicuous bright golden-yellow dust; metanotum bright brown, upper margin gold-dusted; a silvery-white stripe runs on each side from just below the humerus along the hinder part of both mesopleura and sternopleura, meeting the middle coxa. Scutellum concolorous, brown. *Abdomen*: 2nd segment and basal part of 3rd considerably contracted in ♂, slightly less so in ♀; ground-colour bright reddish-brown, 1st segment mainly covered with silvery-white dust, of which there is a narrow band also at the junction of the 2nd and 3rd segments; posterior border of

3rd and more than hinder half of 4th, also the 5th and 6th wholly except sometimes at base of former, with bright golden-yellow dust. Venter and genitalia concolorous, shining brown. *Legs* uniformly orange-brown; basal half of tibiæ more or less pale yellow; tarsi with black bristles. All femora with slight whitish reflections; hind coxæ and outer sides of all tibiæ conspicuously dusted with silvery-white. *Wings* with more than the anterior half rather dark brown, though more yellowish basally; the deep brown colour extends distally to the tip of the 3rd vein and fills the basal half of the 1st posterior cell; while brown of a less deep shade fills the discal and 1st basal cells, and extends indefinitely over the base of the 3rd posterior cell. Halteres brownish-yellow.

Length, 13–14 mm.

Described from several ♂ ♂ from Chapra, Bengal (*Mackenzie*), and 1 ♀ from Hadagalli, Ceylon, x. 1911 ("on flowers"), in the Pusa collection; also 2 ♀ ♀ from Beeravalli, Bellary District, Ceylon, 10. viii–10. ix. 1913. *Cotypes* in my own collection.

281. **Physocephala nigrofasciata**, *Brun.*

Physocephala nigrofasciata, Brunetti, Rec. Ind. Mus. vii, p. 497, pl. xxxvii, figs. 15, 16 (1912).

♂ *Head* entirely orange-yellow; 3rd antennal joint blackish-brown; proboscis fully 2½ times as long as head, black; nearly all the upper half of the occiput is orange-yellow. *Thorax*: dorsum black; humeri and middle of hind margin with conspicuous bright yellow dust; pleuræ mainly orange-brown, a little blackish on lower and hinder parts; scutellum orange-brown; metanotum black, orange-brown above, hypopleura with bright yellow dust. *Abdomen* orange-brown; 1st segment blackish at base; 4th and 5th black on basal two-thirds or more; hind margins of all segments from 1st onwards more or less distinctly, but narrowly, dusted with yellow or yellowish-grey. *Legs* wholly orange-brown; coxæ black, with some whitish reflections; outer sides of tibiæ with rather conspicuous yellow dust. *Wings* grey; anterior half from costa to 4th vein blackish-brown; this colour fills the basal half of the 1st posterior cell, where it is limited rather sharply, but fades away somewhat on the costa between the tips of the 2nd and 3rd veins; basally it spreads slightly into the discal cell. Halteres orange-brown.

Length, 13 mm.

Redescribed from the original *type*, a unique ♂ in the Indian Museum. Koygar, Central Asia (*Yarkand Expedition*). Though this species has not so far been taken within the limits of British India, it is included here, as it may very possibly occur in Northern India; also it would be liable to be overlooked unless incorporated in a general work with other members of the genus.

282. Physocephala rufescens, sp. nov. (Pl. VI, fig. 11.)

♂ ♀. *Head* brownish-yellow to pale yellow; antennæ orange-brown or orange, style short and blunt; foveæ sometimes blackish, occiput black but extensively yellowish behind vertex; proboscis black, over twice as long as head. *Thorax* orange-brown, with a large central, dorsal, quadrate, blackish spot, reaching the anterior margin (possibly this is due to discoloration); humeri and a small space in middle of hind margin dusted with golden-yellow; pleuræ with a very small yellow dust-spot on lower part of mesopleura and upper part of sternopleura; hypopleura conspicuously gold-dusted *; scutellum orange-brown; metanotum black. *Abdomen*: 1st segment blackish; 2nd segment and basal third of 3rd segment, orange-brown; middle third of 3rd segment and about basal half of 4th and 5th, black; hinder part of 3rd segment, remainder of 4th and 5th, and all 6th, dusted with yellowish or yellowish-grey. *Legs* brown-orange, coxæ more or less blackish, with a little whitish dust or shimmer; about basal half of all tibiæ more or less lemon-yellow; pulvilli pale yellowish. *Wings* grey; dark brown from the anterior margin to the 4th vein, though the costal cell is a trifle paler; the brown colour is limited distally, though not sharply, at about the tip of the 2nd vein and the middle of the 1st posterior cell, but is continued faintly along the costa to the tip of the 3rd vein, which is distinctly suffused. Hinder side of discal cell narrowly brown, the base indistinctly so. Halteres brown-orange.

Length, 10–11 mm.

Described from the *type* ♂ in the Indian Museum from Kashmir, 1915 (*H. T. Pease*), and two ♂ ♂ and the *type* ♀ from the same locality, 5000 ft., v. 1901 (*Col. Nurse*).

283. Physocephala nursei, sp. nov.

♂ Very near *aurantiaca*, Brun. Dorsum of thorax with three blackish stripes of the usual pattern; the pleural stripe is of gold-yellow dust, and is much broader and more conspicuous; the hypopleuræ have equally conspicuous gold dust, as has also the upper half of the metanotum. Wing-band rather dark brown, delimited distally just beyond the tip of the 2nd vein, and filling the basal half of the 1st posterior cell; tip of 3rd vein slightly infuscated; 1st basal and discal cells, also remainder of wing, clear.

Length, 14 mm.

Described from two ♂ ♂. Quetta, vi. 1902 (*Nurse*). *Type* presented by Col. Nurse to the British Museum. The specific distinctness of this insect rests on the thoracic stripes and the less extent of the brown colour in the wings; especially in the 1st basal and the discal cell being quite clear, both of them being brown in *aurantiaca*.

* In the type ♂ the gold dust marks have almost entirely faded away.

284. Physocephala argentifera, sp. nov.

♂ ♀. *Head* wholly orange or yellowish-orange; antennæ a little darker, their 3rd joint often bright reddish-orange above and much darker, nearly black, on apical half of under side; it is two-thirds as long as the 2nd joint (measured along the under side); proboscis black, sometimes very dark brown in middle; occiput orange, margin with a whitish shimmer. *Thorax* bright brown or reddish-brown; dorsum sometimes with a median blackish stripe, generally with whitish reflections, especially on hind margin, inner sides of humeri and upper part of the concolorous metanotum, which latter is sometimes dusted with yellowish-white, but mainly black behind; humeri dull orange or brownish-yellow; there is a whitish or silvery-white pleural stripe as in many other species; scutellum orange-brown; there is a conspicuous golden-yellow dust-spot on each hypopleura, the two connected by a band of similar colour across the upper part of the metanotum. *Abdomen* orange-brown, only slightly contracted at base; 2nd segment with silvery-white or yellowish-white dust at base and also (interrupted in middle) on hind margin; 1st segment sometimes with a black patch, occasionally wholly black; 2nd segment with or without a long median streak; 3rd segment varying from wholly brownish to having more than the hinder half blackish; 4th segment varying from wholly brown to having the anterior half blackish; 3rd and 4th segments with hind borders moderately broadly gold-dusted; apparently the 5th and 6th segments are in normal cases wholly gold-dusted. *Legs* orange; tibiæ paler yellow on basal half; anterior coxæ more or less, hind pair brilliantly, shining with silvery-white dust; anterior tibiæ with brilliant silvery-white reflections on the outer side, but these are much less conspicuous on the hind tibiæ; tarsi blackish towards tips; pulvilli orange. *Wings* grey; anterior part blackish-brown from the costa to the tip of the 3rd vein (though the costal cell itself and the tip of the submarginal cell are a little clearer), also as far hindwards as the 3rd vein; the dark colour also extends over the basal half of the 1st posterior cell, but is rather sharply delimited distally, though in some specimens the wing is a little paler towards the tip. Halteres orange.

Length, 8–10 mm.

Described from a few specimens from Chapra, Bengal, *type* ♂ (*Mackenzie*); Allahabad, 8. x. 1905 and 16. x. 1905, *type* ♀ (*Howlett*); Pusa, 4. ix. 1908, and two ♂ ♂ without data. *Type* sent to the British Museum by Mr. T. B. Fletcher, cotypes in the Pusa collection and my own. A conspicuous character of this species is the gold dust-band across the upper part of the metanotum, joining the gold-dusted areas on the hypopleuræ.

285. Physocepala munda, *Brun.*

Conops mundus, Brunetti, Rec. Ind. Mus. vii, p. 496 (1912).

♂ ♀. *Head* pale lemon-yellow; frons about half width of head; vertex well defined, sub-tumid; cheeks with silvery reflections;

antennæ bright orange-brown, tip of 3rd joint sometimes blackish; 2nd joint twice as long as 1st; proboscis brownish-yellow, tip black, barely twice as long as head; occiput blackish, with a brilliant wide gold dust-stripe on the side margins. *Thorax* orange-brown, with humeral region and area towards hind margin of dorsum dusted with golden-yellow, as the whole dorsum appears to be when viewed from in front. Pleuræ concolorous, with a silvery or golden-yellow dust-stripe from edge of dorsum to hind margin of sternopleura; scutellum orange-brown; metanotum and hypopleura richly dusted with golden-yellow. *Abdomen* bright orange-brown, hind margins of 1st and 2nd segments whitish- or gold-dusted, more obviously so towards sides; 3rd and 4th segments broadly gold-dusted towards hind margins, remaining segments wholly dusted with gold. Pubescence very short and inconspicuous. *Legs* bright orange-brown; coxæ with silvery-white reflections; basal half of tibiæ lemon-yellow, outer side with glistening golden-yellow reflections. *Wings* clear; costal cell pale dirty yellow; the blackish band between the 1st and 3rd veins extends distally to about the tip of the 2nd vein, dying away there; halteres pale yellow.

Length, 12 mm.

Redescribed from the *type* ♀ (not ♂ as originally stated) from Puri, Orissa Coast, 6–13. xi. 1910 (*Kemp*), a second ♀ from Balighai, near Puri, 16–20. viii. 1911 (*Annandale & Gravely*); Deesa, iii, viii, ix, x, & xi. 1901 (*Nurse*); Quetta, iii, viii, & ix. 1901, and v. 1902 (*Nurse*). *Type* in Indian Museum.

This species is coloured clean yellow and orange, and is principally distinguished from all others by the dark band of the wing dying away gradually instead of being more or less sharply delimited distally. *P. munda* is somewhat intermediate between *Conops* and *Physocephala*, as the anterior femora are not incrassated, though the hind ones are appreciably so, and the anterior cross-vein is distinctly beyond the middle of the discal cell; both of these characters are more indicative of the latter than of the former genus.

A variety of this species has the 3rd antennal joint black except at the base, where it is reddish-orange. The dorsum of the thorax is wholly dusted with grey; the grey dust extends to all the margins, and includes the humeri, scutellum and metanotum, though there is a trace of a median dark stripe on the anterior half of the dorsum in the ♂. The pleuræ bear a broad, conspicuous, whitish-grey stripe. The wing-band in the ♂ dies away, exactly as it does in typical *munda*; but in the ♀ it ends in an almost truncate form (though its limit is not very sharply defined) at the tip of the 2nd vein, but just enters the top corner of the 1st posterior cell.

Length, 12 mm.

Described from a ♂ and ♀ taken by Col. Nurse at Quetta, viii & v. 1902 respectively. The ♂ was presented by him to the British Museum. A second ♀ specimen is intermediate between the normal form and this variety.

286. Physocephala atricornis, sp. nov.

♂. Very much like *P. calopus*, Big. It differs by having the 2nd and 3rd antennal joints wholly black, while the 3rd is rather dark brown; occiput with a broad transverse black stripe; metanotum rather light brown, dusted with pale golden-yellow; abdominal segments not bordered with orange, but with a little pale yellow dust, the last segment being wholly dusted with pale golden-yellow; and the tarsi brown, not black. The black band on the wing does not even encroach on the 1st basal cell, much less on the discal, and the wing is wholly dark from the costa to the posterior limit of the band, *i. e.* the 3rd longitudinal vein. The dark colour also fills the basal half of the 1st posterior cell: moreover, it extends along the costa to beyond the tip of the 2nd vein, but is thence rather sharply delimited. This difference in the longitudinal extent of the band is perhaps the best specific character.

Length, 8 mm.

One ♂ in the Pusa collection, from Lahore, Punjab, 20. iv. 1908, sent by Mr. T. B. Fletcher to the British Museum.

287. Physocephala annulifera, *Brun.*

Physocephala annulifera, Brunetti, Rec. Ind. Mus. vii, p. 498 (1912).

♂ *Head* deep yellow, slightly reddish above antennæ, slightly livid on vertex; a large black triangular mark on frons, apex downwards, the base incurved. Antennæ dark reddish-brown; tips of 1st and 2nd joints a little pale below, 2nd joint minutely pubescent. Proboscis light shining brown, about twice the length of the head, tip shining black. Eyes bright chestnut-brown, posterior margins silvery-white tomentose. Back of head brown, livid towards vertex. *Thorax* wholly dull black; humeral calli and sides of thorax with a very little whitish dust. Scutellum and metanotum dark brown. *Abdomen* dark brown, lighter on 2nd and base of 3rd segment, these parts being much contracted; 3rd, 4th and 5th segments with a moderately wide gold-dusted posterior border; 6th segment gold-dusted on dorsum. Genital apparatus somewhat withdrawn; consisting of a large upper globular piece, a pair of claspers (apparently), and a narrow intermediate organ, all dark brown, shining and bare. The whole abdomen bears minute black hairs. *Legs*: coxæ black, dusted with silvery-white; femora reddish-brown, hind pair somewhat thickened in basal half, and with apical half darker; tibiæ reddish-brown, with silvery-white dust; fore pair darker; posterior pairs attenuated towards base; hind pair lighter in colour on basal half; tarsi dark brown. All the legs are microscopically pubescent. *Wings* almost clear; a blackish colour extends along the costa from the base as far as just beyond the tip of the 2nd longitudinal vein; this colour reaches posteriorly as far as the 3rd longitudinal vein, where it sharply terminates, but is continued into the basal half

of the 1st posterior cell, the outer edge of the coloured part being perpendicular but without a clear-cut limit. The 1st posterior cell is closed some distance before the border. Anterior cross-vein just beyond centre of discal cell, which is just half as wide at base as at distal end. Halteres blackish.

Length, 8 mm.

Described from a single ♂ (not ♀ as previously stated), originally in good condition but now somewhat damaged, in the Indian Museum collection from Margherita, Assam.

288. **Physocephala calopus**, *Big.* (Pl. VI, figs. 12, 13.)

Conops calopus, Bigot, Ann. Soc. Ent. France, (6) vii, p. 33 (1887).
Physocephala quadrata, Brunetti, Rec. Ind. Mus. ix, p. 274, pl. xiv, fig. 5 (1913).

♂ ♀. *Head* yellow or brownish-yellow; frons distinctly over one-third width of head, sometimes irregularly infuscated with black; antennæ brownish-yellow to orange, 3rd joint often bright reddish-orange, especially below, tip generally blackish; mouth-opening more or less blackish; proboscis black, twice as long as head; occiput black, broadly yellowish behind vertex, with side margins silvery. *Thorax* brownish-yellow or orange-brown; dorsum mainly blackish; humeri pale, generally dusted with whitish; scutellum concolorous with dorsum; metanotum blackish; pleuræ orange-brown, with a broad silvery-white stripe. *Abdomen*: 1st segment black; 2nd orange-brown, often with a broad black median band; 3rd with nearly basal half orange-brown, remainder black, with yellowish-dusted or grey-dusted hind margin; 4th and 5th black with rather narrow yellowish-dusted or grey-dusted hind margins; 6th dark brown or blackish, wholly but lightly dusted with grey. *Legs*: coxæ varying from orange-brown to blackish, hind pair with a silvery shimmer. Rest of legs orange or orange-brown; hind femora with a broad black median ring occupying nearly their whole length; hind tibiæ blackish on about apical third; hind tarsi more or less blackish throughout, anterior tarsi blackish towards tips. All the tibiæ are rather lemon-yellow basally, and they all have a silvery-white shimmer on the outer side. *Wings* pale grey; the dark band is blackish or dark brown, and extends hindwards to the 3rd vein, the colour in normal specimens being rather sharply delimited at the tip of the 2nd vein and barely entering the 1st posterior cell; sometimes it ends distinctly beyond the tip of the 2nd vein, and in these cases it also fills nearly all the basal half of the 1st posterior cell.

Length, 7½–9 mm.

Almora, Kumaon District, 5500 ft., 27. ix. 1911 (*Paiva*); Deesa, iii & xi. 1899, and ix. 1901; Quetta, v. 1902; Abu (all these collected by *Nurse*); Sukna, base of Darjiling Hills, 2. vii. 1908, ♂ ♀ *in cop.* (*Annandale*); Singla, Darjiling District, 1500 ft., iv. 1913 (*type* of *quadrata*); Pashoke, Darjiling District, 2000 ft.,

vi. 1916 (*L. C. Hartless*). The species was originally described from Pondicherry. *Type* of *calopus* in Bigot's collection, that of *quadrata* in the Indian Museum.

Redescribed from several of both sexes, which seem referable to this species, from various sources. The exact limits of the dark wing-band are uncertain, and the species appears variable in the coloration of the antennæ and of some other parts of the body.

Bigot has unaccountably mistaken the 1st posterior cell for the discal, both in this and other species; this is shown by his remark (referring to *calopus*) that the wing-band ends "about opposite the middle of the discal cell, of which it also covers the base."

289. **Physocephala diffusa,** sp. nov.

♂ ♀ *Head* yellow; vertex dull yellow and tumid; sides of frons orange-brown, this colour extending some distance down the face, with a narrow darker line on each side of the deeply sunken foveæ, which latter are pale yellowish with a dark brown streak on the lower part of each. Proboscis dark brown, black at base and tip. Antennæ bright orange-brown; 3rd joint, apart from style, barely half as long as 2nd, its tip darker. Occiput yellowish, each side with an irregular brown patch, these patches being connected by a transverse stripe; hinder part of eye-margins dusted with pale golden-yellow. *Thorax* brownish-orange with dusty whitish reflections; dorsum rather darker, with traces of a median blackish stripe on the anterior margin; scutellum concolorous; metanotum black, gold-dusted; pleuræ brownish-orange, with a silvery-white side stripe extending from in front of the wing-base to the middle coxa; metapleuræ with conspicuous golden-yellow dust. *Abdomen* orange; 1st segment darker brown on the dorsum and with the hind margin white-dusted; 2nd segment narrowly white-dusted on the hind margin and more broadly so at sides towards apex; 4th and 5th with basal half more or less dark brown; hind border of 3rd, remainder of 4th and 5th, and whole of the 6th, dusted with gold. *Legs*: coxæ blackish, anterior pairs with slight whitish reflections, hind pair conspicuously dusted with yellowish-white; femora orange; tibiæ pale yellow at base, their outer sides shining, dusted with yellowish-white; the hind pair are distinctly brown towards the tips; tarsi orange, brownish on upper side, with black bristles. *Wings* grey; a dark brown band on anterior margin to a little beyond tip of 2nd vein (varying with the individual), generally rather sharply delimited opposite posterior cross-vein; the band delimited hindwards by 3rd vein, but filling about basal half of 1st posterior cell, leaving remainder quite clear. Sometimes the costal band extends indistinctly to the tip of the 3rd vein, or the tip of the 3rd vein may bear a slight isolated infuscation. Base of 3rd posterior cell sometimes brownish; costal cell slightly pale. Halteres brownish-orange.

Length, 7–8 mm.

Described from a ♂ from Chapra, Bengal (*Mackenzie*), now sent to the British Museum by Mr. T. B. Fletcher, and a second ♂ from Coimbatore, 17. vii. 1912. In this second specimen (which is in the Forest Zoologist's collection) the distal end of the wing-band is truncate. There are also 2 ♂ ♂ and 2 ♀ ♀ in the British Museum, received from the Bombay Natural History Society, without data.

290. **Physocephala tenella**, *Big.*

Conops tenellus, Bigot, Ann. Soc. Ent. France, (6) vii, p. 35 (1887).

♂ ♀. *Head* brownish-yellow to pale yellow; frons sometimes partly or wholly black. Antennæ brownish-orange, sometimes darker, 2nd joint about 2½ times as long as 1st, 3rd (without style) barely half as long as 2nd. Foveæ often blackish. Proboscis blackish-brown, double as long as head. Occiput mainly blackish, broadly brownish-yellow behind vertex; side margins with silvery or silky-yellow reflections. *Thorax* wholly orange-brown, sometimes with three more or less distinct dark stripes, the median one attaining the anterior margin; pleuræ with a silvery-whitish stripe; scutellum orange-brown; metanotum black, its upper part conspicuously gold-dusted, this golden dust uniting two golden dust-spots situated one on each hypopleura. *Abdomen*: 1st segment black; 2nd segment and basal third of 3rd segment, orange-brown; there is a broad median stripe on the former, sometimes reduced to two short, black, longitudinally placed vittæ, lying side by side; middle third of 3rd segment, basal half of 4th, 5th broadly at base, 6th narrowly at base, black; remainder of abdomen dusted with golden-yellow. *Legs* orange-brown or orange; coxæ a little darker, hind pair at least with whitish reflections; hind femora normally with a broad median band, which may be incomplete on the under side or reduced to a longitudinal streak only on the upper side, and which is frequently altogether absent. The hind tibiæ are paler yellow basally, with their apical third generally brownish or blackish; all the tibiæ have silver or pale gold reflections on the outer side; tarsi generally darker brown. *Wings* nearly clear. The dark band is limited behind by the 3rd vein; it usually ends sharply at the distal extremity a little beyond the tip of the 2nd vein, and fills the basal half of the 1st posterior cell; but it is often continued faintly to the tip of the 3rd vein, where it is darkened. The apical section of the 3rd vein is sometimes independently suffused, and an extremely narrow darkening in front of the 5th vein is sometimes present. Halteres yellow.

Length, 8–11 mm.

Redescribed from a typical ♂ and ♀ in the Bigot collection and from several specimens in the British Museum. Simla, viii. 1898; Kangra Valley, 4500 ft., vi. 1899, two ♂ ♂ (*Dudgeon*); Coimbatore, S. India, 5. viii. 1913, on maize, ♀; 18. xi. 1913; Singapore

(*Ridley*), and another specimen without data. The species was originally described from Ceylon. *Types* in Bigot's collection.

In one ♀ from Quetta, vi. 1902 (*Nurse*), which may be referred to this species, the dark brown wing-band is continued to the tip of the 3rd vein, the costal cell is distinctly clearer, the 3rd antennal joint is blackish, the thoracic dorsum is wholly blackish (both these parts are possibly discoloured), and the parts which are gold-dusted in the normal form are in this specimen dusted with greyish. Length identical with that of normal form.

If this species is really distinct from *calopus*, Big., a point about which I am undecided, the only differences appear to be as follows. In *tenella* both branches of the 5th vein are more or less narrowly infuscated, as is also the space between them (*i. e.*, the base of 3rd posterior cell); the dark costal band extends distinctly beyond the tip of the 2nd vein (though a few specimens referred by me to *calopus* also exhibit this condition); the band itself is rather dark brown than black, and it fills approximately half the 1st posterior cell and reaches the hind margin of that cell; whereas in *calopus* the band is more black than brown and usually ends exactly at or barely beyond the tip of the 2nd vein, often entering only very slightly into the 1st posterior cell and even then not attaining the hind margin of that cell. The abdomen, particularly the 6th segment, is more orange or brownish in *tenella*, especially in the ♂. In *calopus* the abdomen is principally black.

Subfamily MYOPINÆ.

The principal characters are the presence of the ocelli, the absence of the subcostal cross-vein except in *Stylogaster*, *Zodion* and *Pleurocerinella*, and the ending (in normal cases) of the 3rd antennal joint in a two-jointed, dorsal, sometimes style-like arista (in *Pleurocerinella*, a true two-jointed style). This subfamily has been transferred to the MUSCIDÆ by some authors, but I consider that its position is undoubtedly in CONOPIDÆ. In the arrangement of the genera I have placed *Pleurocerinella*, *Stylogaster* and *Zodion* first, next to the CONOPINÆ, as they all possess the subcostal cross-vein. For remarks on life-history, see p. 342.

Table of Genera.

1. Anal cell extremely short and small, subequal to 2nd basal cell; a complete thoracic chætotaxic system of strong, conspicuous, long bristles; tibiæ with short spurs .. .. [p. 369. STYLOGASTER, Macq.,

Anal cell very long, generally approachiug wing-border; no chætotaxic system; tibiæ unspurred .. .. .. 2.

2.	Third antennal joint conspicuously long, more than twice as long as 2nd, subcylindrical, with distinct apical style	[gen. n., p. 368. PLEUROCERINELLA,
	Third antennal joint never conspicuously long or cylindrical, but oval or oblong, with a dorsal arista often thickened basally ...	3.
3.	Proboscis not geniculated at about middle, but only at the base; a rudimentary subcostal vein present	ZODION, Latr., p. 373.
	Proboscis geniculated at about middle as well as at base; subcostal vein always absent	4.
4.	Head in profile descending much below eyes; cheeks at least twice as high as diameter of eyes	MYOPA, Fabr., p. 377.
	Head in profile descending only moderately below eyes; cheeks at most as high as diameter of eyes	5.
5.	Antennæ shorter than the distance from their base to the vertex	SICUS, Scop., p. 376.
	Antennæ longer than this distance.. ..	OCCEMYIA, Rob.-Desv., [p. 382.

PLEUROCERINELLA, gen. nov.

Intermediate between *Conops* and *Pleurocerina*, Macq.; having the general *facies* of the latter, but the antennæ placed at the tip of the extended frons as in *Conops*, instead of at the side of this extension. 1st antennal joint rather elongate, cylindrical, 2nd a little shorter than 1st, produced a little at the tip over the base of the 3rd; the latter much longer that the 1st and 2nd together, elongate-conical, slender, tapering from base to tip, with a moderately short, very pointed, basally jointed, apical style, often thickened at base. In all else as in *Conops*: femora not at all thickened; subcostal cross-vein present, very short and rather indefinite, situated at tip of auxiliary vein.

GENOTYPE, *P. dioctriæformis*, sp. nov.

291. **Pleurocerinella dioctriæformis**, sp. nov.

♂ ♀ *Head*: vertex and frons black; face pale yellow; frons and face with a brilliant, silvery-white shimmer when seen from above; foveæ very deep, shining silvery. Eyes dark coffee-brown. Antennæ blackish-brown; 2nd joint bristly, a little shorter than 1st; 3rd at least 1½ times as long as 1st and 2nd together, more or less elongate-conical but laterally compressed in the apical half; style short and very pointed, not thickened at base. Proboscis shining black, about as long as head; labella well developed, light brown, pubescent. Occiput shining black, a little grey-dusted towards margins, with brownish-yellow hairs behind vertex. *Thorax*: dorsum, pleuræ, scutellum and metanotum rather shining black, with a little pale pubescence except on the

latter; a vertical, glistening silvery stripe on middle of pleuræ passing in front of wing-base. *Abdomen* shining black, of the form normal in *Conops*, with a little, just obvious, pale brown pubescence; 1st segment hardly wider than 2nd; 2nd and 3rd segments subequal, a little longer than 4th and 5th; 5th with a long black genital sheath; 6th and 7th large, rounded. Genitalia inconspicuous. *Legs*: femora not at all thickened, tibiæ without the "twisted" appearance so common in the CONOPINÆ. Legs mainly dark brown or black; coxæ with whitish reflections;

Fig. 77.—*Pleurocerinella dioctriæformis*, sp. nov., antenna.

femora pale brownish-yellow at base and tips; basal half of fore and hind tibiæ, and almost the whole of the middle pair, pale brownish-yellow; metatarsi mainly brownish-orange, with whitish pubescence below. *Wings* pale grey; anterior cross-vein opposite tip of auxiliary vein and at middle of discal cell; posterior cross-vein erect, opposite tip of second vein; halteres pale yellow.

Length, 8–9 mm.

Described from a ♂ and ♀ in the British Museum from Simla, viii. & ix. 1898 (*Nurse*); also a ♀ from Maskeliya, Ceylon (*Green*).

Genus **STYLOGASTER**, *Macq.*

Stylogaster, Macquart, Hist. Nat. Ins., Dipt. ii, p. 38 (1835).
Stylomyia, Westwood, Proc. Zool. Soc. Lond. p. 270 (1850).
Ptychoproctus, Bigot, Rev. Mag. Zool. p. 308 (1859).

GENOTYPE, *Conops stylata*, Fabr.; by original designation.

Head large, transverse, barely projecting beyond eyes either in front or below, much broader than long and much broader than thorax. Eyes widely separated in ♂ and ♀; front facets very greatly enlarged in both sexes; ocelli present. Antennæ elongate, porrect; 3rd joint as long as 1st and 2nd together, sword-shaped, with tip rounded; arista subapical. One pair of strong vertical bristles. Proboscis very long and thin, rigid, geniculated at about the middle. *Thorax* approximately quadrate, a little drawn out hindwards; humeri distinct; scutellum of moderate size, sub-triangular with rounded corners. There are 1 or 2 weak humeral bristles, 2 presutural, 1 or 2 supra-alar, 1 dorsocentral (pre-scutellar), 1 or 2 on each of the posterior calli, 1 mesopleural, and 1 pair of scutellar, apical in position. All the bristles are strong. *Abdomen* elongate, distinctly longer than thorax, cylindrical, a

little curved downwards, in the manner typical of CONOPIDÆ; six-segmented; 6th segment very long and narrow in ♀; genitalia in ♂ conspicuous and complicated *, in ♀ very elongate, sub-cylindrical, somewhat like those of TIPULIDÆ in general appearance. *Legs* long, slender, simple, practically bare; tarsi as long as or longer than tibiæ; hind legs much longer than the others; hind femora slightly but obviously dilated from beyond the base. *Wings* cuneiform at base; auxiliary vein extremely short, sub-costal cross-vein present, though sometimes rudimentary; 1st posterior cell closed well before the wing-border, elongate; anterior

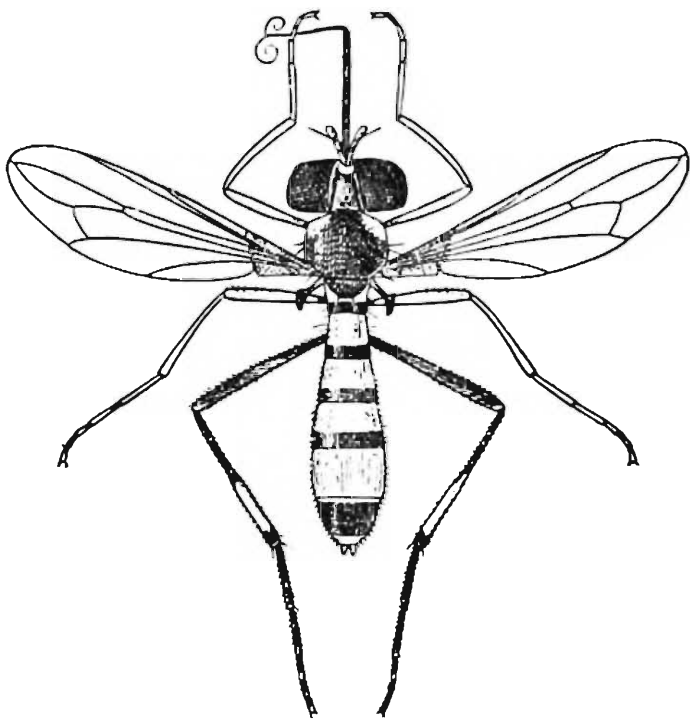

Fig. 78.—*Stylogaster orientalis*, sp. nov.

cross-vein considerably beyond middle of discal cell; the latter is very long and very narrow at the base; 2nd basal cell short, less than half as long as 1st; anal cell very short, shorter than 2nd basal; 6th vein distinct to wing-border (in some New World species it is shortened); 7th vein rudimentary or absent; squamæ obsolete.

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* In the African species, *S. complexa*, Big., the ♂ genitalia are complex and conspicuous, protected by a large sheath (like that found in *Conops*) on the 5th segment. There is a large bowl-shaped ventral plate, narrowed at the base; a pair of long, slender, horny, finger-like processes slightly curved; a smaller pair of clavate processes behind them; and a longer, pointed, median organ with a few bristly hairs at the tip; all these parts are pale yellow and practically bare, except the ventral plate, which bears short, soft, pale yellow hairs on the under side. In a North American species of uncertain identity the genital parts are different, though apparently of the same general plan, but the condition of the specimen precludes any description.

Range. With the exception of the new species described here from India, and of two or three African species, the few known representatives of this peculiar genus are confined to the Americas.

Life-history not worked out, but it is thought that these insects are parasitic on ants. Bates, in 'The Naturalist on the Amazons' (end of chapter xii) states that these flies follow ants of the genus *Eciton* in small swarms, probably for the purpose of depositing their eggs in the food which the ants are carrying into their nest, in which place the *Stylogaster* would thus be bred. Professor W M. Wheeler has, however, little doubt that the flies are entoparasites in the bodies of the adult ants, not of their prey: see 'Ants' (New York, 1910), pp. 261, 419.

Williston makes this genus the type of a separate subfamily, but the only important differences between it and other MYOPINÆ consist in the shortness of the anal cell, the narrowness of the

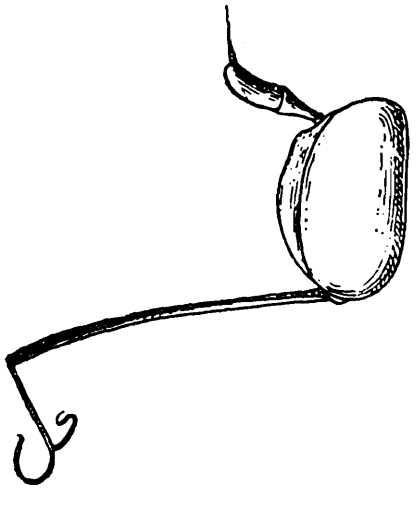

Fig. 79.—*Stylogaster orientalis*, sp. nov., profile of head.

frons in the ♂, and the great length of the ovipositor in the ♀. Though Macquart both described and figured the anal cell as elongate, this must have been an error on his part. The question as to the exact identity of the species *stylata*, Fabr., on which he founded his genus need not be discussed here, but it may be observed that though Roeder is of the opposite opinion, Williston considers its exact determination to be now impossible. Williston also claims that Wiedemann, in redescribing *stylata*, had really two species before him and only females of each, instead of both sexes of *stylata*. Other species from North America referred to *Styloyaster* have the anal cell extremely small, and I have not been able to trace a single species in which it is long. Westwood's genus (*Stylomyia*) was stated to differ from Macquart's mainly in the very small anal cell, but the two may now be considered absolutely synonymous, it being impossible to avoid the conclusion that Macquart was in error as regards this cell. Williston states that the subcostal cross-vein (though he does not

call it thus) is absent, but it is present in *orientalis* and in several undescribed species in the British Museum, though it is often rudimentary. The distance from the base at which the proboscis is geniculated varies with the species, being distinctly after the middle in *orientalis*, and at about the middle in the two or three African species in the British Museum.

292. **Stylogaster orientalis**, sp. nov.

♂. *Head*: eyes separated at vertex by nearly one-third the width of the head, but by only half this width at level of antennæ. Vertex with a long black erect bristle on either side placed near the corner of the eye. Frons shining black, with a broad, dark brown, velvet-like stripe on each side, these stripes being themselves very narrowly margined by a narrow pale line on either side. Ocelli very small, placed near the absolute vertex. Face and lower part of head yellowish-white; mouth-opening very large. Proboscis three to four times the height of the head, geniculated beyond the middle, black; extreme base, and the divided curled tips, yellowish-white. Antennæ with 1st joint short, rather thick; 2nd elongated, broader at tip, 3rd elongate-oval, very large, with subapical, black, bare arista. Antennæ brownish-yellow, with an oblique brown streak on the inner side of the 3rd joint, and the tip also barely darker. Occiput blackish. *Thorax*: dorsum and scutellum blackish; humeri and rest of thorax yellowish-white. Several bristles behind, one in front of and one below, the wing-base. Scutellum with two long apical bristles. *Abdomen* brownish-yellow, 1st and last segment wholly black on dorsum, remainder of segments with a broad black band on hind margin. Under side and genitalia pale yellow. Genitalia in general construction as in *S. complexa*, Big., from Natal; ventral plate less bowl-shaped, much smaller, shortly bifid at tip; the long, slender horny processes much more curved, the clavate processes and the median organ somewhat similar though smaller. *Legs*: anterior pairs pale whitish-yellow; tarsi rather darker towards tips. Hind legs much longer, hind coxæ and femora distinctly enlarged, the latter much narrowed at the base, blackish above, the colour interrupted transversely in the middle; tibiæ (which are enlarged towards the tips) dirty pale yellow; tarsi black. All the legs apparently bare, the minute pubescence only visible under considerable magnification. *Wings* pale grey; venation in accordance with generic characters; halteres with pale yellow stems and comparatively large black clubs.

Length, 6 mm. (measured along curve of abdomen).

Described from a perfect ♂ in the Indian Museum from Parambikulam, Cochin State, 1700–3200 ft., 16–24. ix. 1914 (*type*) (*F. Gravely*); a second ♂ in the same collection from above Tura, Garo Hills, Assam, 3500–3900 ft., 15. vii–30. viii. 1917 (*Kemp*); and a third ♂ in the British Museum from Pundaluoya, Ceylon (*Green*).

Genus **ZODION**, *Latr.*

Zodion, Latreille, Hist. Nat. Crust. Ins. iii, p. 444 (1802); id., Précis des Caract. gén. d. Ins., p. 162 (1796, *sine specie*).

GENOTYPE, *Myopa cinerea*, Fabr.; by original designation.

Head rather large, not much broader than thorax, bare; epistome receding; lower part of head projected downwards much below eyes; cheeks nearly as broad as longer diameter of eyes. Eyes wide apart in both sexes, bare. Proboscis very thin, slightly bristly, bent at base only, so that it is horizontal, prominent, curved slightly anteriorly; labella very small; palpi short, cylindrical, bristly. Ocelli present. Antennæ porrect, short; 1st joint shortest, 2nd and 3rd subequal, 1st and 2nd bristly, 3rd bare and oval, with short style-like dorsal arista. *Thorax* subquadrate with rounded corners; scutellum semicircular. *Abdomen* moderately long, arched above, flat below, rather enlarged apically, with moderately prominent genitalia of the usual type. *Legs* moderately long and stout; femora slightly thickened, hind pair hardly longer than the others, finely bristly. *Wings* of normal venation; 1st posterior cell usually closed at margin, sometimes slightly petiolate, sometimes narrowly open*; anal cell long, nearly reaching border of wing; subcostal vein present, sometimes rudimentary.

Range. Europe, Canary Is., Orient, North and South America.

Life-history. Z. cinereum is parasitic on the bee *Hylœus 4-strigatus*, Latr.

The representatives of this genus are typically Myopine, almost bare flies of grey hues, with abdomen sometimes spotted, and clear wings. They occur on flowers and in grassy spots, and are not uncommon in the places where they are found.

Table of Species.

1.	First posterior cell closed; (scutellum with six rather robust bristles on hind margin, set in six distinct blackish-brown spots; spots on hinder part of thoracic dorsum larger and more conspicuous than in *griseum*)	*cinereum*, Fabr., p. 374.
	First posterior cell distinctly open	2.
2.	Hind femora with basal half orange; anterior femora dark brown, paler at base; antennæ considerably reddish-orange, 2nd joint much longer than 3rd; 3rd vein distinctly bisinuate from anterior cross-vein to tip.... . ..	*montanum*, Brun., p. 375.

* The 1st posterior cell has hitherto always been described as closed, but some species, both North American and Indian, undoubtedly belonging to *Zodion*, have it very distinctly, though narrowly, open.

Hind femora black, wholly and closely grey-dusted, orange towards tips; antennæ entirely black; 3rd vein nearly straight from anterior cross-vein to tip. (Scutellum with 8 to 10 long fine hairs, the spots on the hind margin much less conspicuous than in *cinereum*; spots on hinder part of thoracic dorsum also less conspicuous than in *cinereum*) *griseum*, sp. n., p. 375.

293. Zodion cinereum, *Fabr.**

Myopa cinerea, Fabricius, Ent. Syst. iv, p. 399 (1794).
Zodion cinereum, Schiner, Faun. Austr. i, p. 381 (1862).

♂ ♀. *Head*: Vertex and upper part of frons dark mahogany-brown or reddish-brown, becoming bright orange-brown or orange on about anterior half of frons; generally with very narrow silvery-white eye-margins extending for some distance; ocellar triangle black. Antennæ mainly red-brown or orange-brown, sometimes wholly so; generally with 1st joint, upper part of 2nd and apical half of 3rd, more or less black; occasionally practically the entire antennæ are black. Rest of head from orange-yellow to very pale yellow; proboscis black, fully twice as long as head. Occiput cinereous-grey; nearly all the upper half is clothed with short black bristles; the median part is comparatively bare, but with about four long fine bristles well below the vertical margin; the lower part is yellowish, nearly bare. *Thorax* cinereous, with darker brown marks varying in individuals; the general pattern consists of a pair of narrow dorsal stripes extending from the inner corners of the humeri and reaching beyond the suture; there is an outer stripe on each side running from behind the humerus, and generally reaching beyond the suture; a pair of inner short vittæ on or near the anterior margin; and a small, very dark brown, shining spot on the inner side of each humerus. The longer stripes are sometimes broken into elongate spots; hinder part of dorsum with rather numerous large spots or dots irregularly placed. Scutellum concolorous, with six conspicuous, moderate sized, dark brown spots on hind margin, each bearing a medium sized bristly hair; rest of scutellum bare of bristly hairs. *Abdomen* cinereous; first three segments a little more brownish-grey; the whole surface with small dark brown dots and fine, rather long, black hairs, the former lying more or less in horizontal rows; last segment in ♀ shining black. *Legs* closely covered with cinereous or pale grey dust; femora, towards the tips, and on the knees for a short distance, often more or less orange-brown; tarsi black or blackish. Pubescence of legs wholly black. *Wings* pale grey, pale orange for a varying extent from base and anteriorly; halteres dull orange.

Length, about 6 mm.

* This common European species has a number of synonyms, which can be obtained from Becker in Kertész, Kat. Paläarkt. Dipt. iv, p. 270 (1905).

Redescribed from a ♂ and 3 ♀ ♀ from Europe, and a ♂ and ♀ from Simla, ix. 1898 (*Nurse*), in the British Museum. This species is widely distributed in Europe.

294. Zodion montanum, *Brun.*

Zodion montanum, Brunetti, Rec. Ind. Mus. vii, p. 499 (1912).

♀ *Head*: frons above antennæ dark reddish-brown on upper part; when viewed from below two large oval whitish-grey dust-spots are visible; vertex and back of head nearly black, the latter with black hairs, the whole of the frons, face, and vertex being hairy; face, cheeks, mouth, and epistome yellow, with (seen from below) a silvery-white sheen. Proboscis black. Antennæ black, under side of 2nd joint yellow, under side of 3rd joint red at base. *Thorax* ash-grey, covered (with the scutellum also) with short black hairs: dorsum and scutellum in certain lights appearing black, except the humeral calli; sides of thorax also appearing partly black if viewed from different directions. *Abdomen* mainly ash-grey, covered with rather short black hair; fore part of most

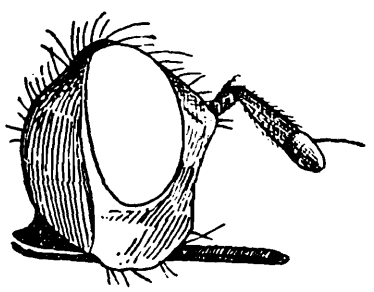

Fig. 80.—*Zodion montanum*, Brun., head in profile.

of the segments black, the colour extending round the sides and also posteriorly in the middle of the dorsum; extreme tip of abdomen shining black. Genitalia small, black, shining, hairy. *Legs* black, pubescent; coxæ with silvery-white sheen in front; anterior femora yellow at base below, hind pair with more than the basal half yellow; knees and base of tibiæ narrowly yellow; anterior metatarsi rather yellow. *Wings* with 1st posterior cell narrowly open; 3rd vein bisinuate from anterior cross-vein to wing-tip; the wings are nearly clear, yellowish at base. Halteres yellow.

Length, 5 mm.

Described from a single perfect specimen captured by me at Darjiling, 30. ix. 1908, and now in the Indian Museum.

295. Zodion griseum, sp. nov.

♂ ♀ *Head*: frons bright mahogany-brown; ocellar tubercle, a small spot on each side near the vertex and contiguous to the eye, and sometimes an indistinct stripe above each antenna, blackish; rest of head orange-yellow with whitish reflections, the latter extending upwards for some distance at sides of antennæ and

along the inner eye-margins; antennæ wholly black, under side of 2nd joint and basal half of 3rd sometimes (*type*) dark reddish-brown with a silvery-white shimmer; occiput blackish-grey; proboscis black, nearly twice as long as head. *Thorax* dark ash-grey, closely beset with short bristly black hairs, and having a pair of median, well separated, narrow blackish stripes, barely reaching anterior margin; three intermediate, very narrow, darker lines; and an indefinite spot on each side on the inner side of the humerus. Pleuræ rather lighter grey, bare except for about six small black bristles on the sternopleura. Scutellum and metanotum concolorous, the former with numerous stiff hairs. *Abdomen* ash-grey, with soft black hairs which are longest towards the sides of the 2nd segment: genitalia inconspicuous. *Legs* dark ash-grey, considerably hairy; under side of femora on apical half, knees and base of tibiæ, orange; rest of tibiæ light grey with whitish reflections; inner side of hind pair blackish; tarsi and claws black, pulvilli orange. *Wings* with 1st posterior cell distinctly open; 3rd vein practically straight from anterior cross-vein to wing-tip; uniformly pale grey, yellowish at base; halteres orange.

Length, 7 mm.

Described from two ♂ ♂ (one being the *type* of the species) from Mussoorie, ix. 1906, in the Pusa collection; and one (*type*) ♀ in the British Museum from Simla, ix. 1898 (*Nurse*).

Genus **SICUS**, *Scop.*

Sicus, Scopoli, Ent. Carn., p. 1004 (1763).

GENOTYPE, *Conops ferrugineus*, L.*

Head large, broad, semicircular; ocelli present; frons and face prominent; cheeks descending in profile to about half the height of the eyes. Antennæ with 1st joint rather short, cylindrical, bristly; 2nd cup-shaped, bristly; 3rd slightly shorter than 2nd, oval, with broadly rounded tip; arista dorsal, thickened at base. Proboscis kneed at base and at middle, about three times as long as head; palpi extremely short. Occiput barely produced behind upper part of head, but much produced in its lower half, with bristly pubescence. *Thorax* approximately square, with rounded corners, fairly well arched; scutellum semicircular. *Abdomen* narrower but longer than thorax, longer in ♀, well curved downwards; sexual organs similar to those of allied genera. *Legs* and *wings* as in *Myopa*.

Range. Europe, Sikkim, North America.

Life-history unknown.

Very like *Myopa* in general appearance, differing practically only in the less depth of the cheeks below the eyes.

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* Coquillett claims to have designated this species as type, but Schiner in 1862 was apparently the first to recognise the genus, which had been ignored or overlooked for nearly a century, as distinct from *Myopa*.

296. Sicus ferrugineus, *L.*

Conops ferrugineus, Linnæus, Faun. Suec. p. 1907 (1761).
Sicus ferrugineus, Schiner, Faun. Austr. i, p. 384 (1862).
Myopa annulipes, Robineau-Desvoidy, Myodaires, p. 246 (1830).

♂ ♀. *Head*: frons from deep red-orange to orange-yellow; ocellar triangle small, brown, with two long fine bristles and some shorter ones; upper corners of frons with some long black bristly hairs and very short ones, extending down sides of frons for a short distance. Antennæ dark reddish-orange or red-brown, the short, thickened arista black; 2nd joint distinctly longer than 1st or 3rd. Rest of head from orange to yellowish, with silvery-white or pale gold reflections; proboscis black. *Thorax* orange-brown, darker or paler; there are three rather broad, nearly contiguous, black stripes, the median one being the longest but not reaching the front margin, all three extending behind suture; a more or less indistinct stripe with a whitish reflection extends on either side from the side margin of the dorsum over the mesopleura and sternopleura. Pubescence of thorax black, moderately dense, more bristly on certain parts of the dorsum. Scutellum concolorous, with a little black bristly hair of varying length and a row of longer hairs on hind margin. *Abdomen* orange-brown, variable; darker in parts, and generally with whitish reflections towards the sides; tip sometimes black, as is also the small sheath below the 5th segment in the ♀ *Legs* mostly orange-brown to tips; coxæ with some whitish reflections; pubescence black, decidedly more bristly and longer on the hind femora, where there are on the under side two rows of black spines, wide apart. *Wings* pale grey, a little yellowish at base in individuals; halteres orange-brown.

Length, 7–12 mm.

Redescribed from specimens in the British Museum from various European localities, and one specimen in the same collection from Tungu, Teesta Valley, Sikkim, 13,000–14,000 ft., 1–15. vii. 1903 (*Tibet Expedition*). A common European species.

Genus **MYOPA** *Fabr.*

Myopa, Fabricius, Syst. Ent. p. 798 (1775).
Fairmairia, Robineau-Desvoidy, Dipt. env. Paris, Myop. p. 31 (1853).
Gonirhynchus, Rondani, Dipt. Ital. Prod. ii, p. 241 (1857).
Haustellia, Robineau-Desvoidy, Dipt. env. Paris, Myop. p. 47 (1853).
Lonchopalpus, Robineau-Desvoidy, op. cit. p. 35 (1853).
Myopella, Robineau-Desvoidy, op. cit. p. 18 (1853).
Myopina, Robineau-Desvoidy, op. cit. p. 39 (1853).
Phorosia, Robineau-Desvoidy, op. cit. p. 29 (1853).
Pictinia, Robineau-Desvoidy, op. cit. p. 15 (1853).
Purpurella, Robineau-Desvoidy, op. cit. p. 37 (1853).

GENOTYPE, *Conops buccata*, L.; by designation of Curtis.

Head large, loosely attached; vertex vesiculose, generally reddish; lower part of head often projecting downwards con-

siderably below level of eyes; epistome bare or finely but distinctly haired; ocelli present; eyes in both sexes wide apart, bare; proboscis long, cylindrical, somewhat bristly, bent at base and at middle; palpi short; antennæ set on a slight prominence, short; 1st joint short, 2nd elongate-conical, both bristly; 3rd much shorter than 2nd, round or oval, bare, with dorsal, basally thickened arista. *Thorax* subquadrate, shorter than broad; scutellum semicircular. *Abdomen* very short, curved, narrowed at base, bare or slightly pubescent, posteriorly rather broader. Genitalia in ♂ not prominent, and only moderately so in ♀. *Legs* moderately long and stout; hind femora rather longer, pubescent. *Wings* with venation as in *Conops*, often with darker markings.

Range. World-wide.

Life-history. Heyden has stated that the larva is parasitic on certain Hymenoptera, as is customary in this family. The adults are generally distributed, occurring especially on umbelliferous flowers, and are sluggish in nature.

Myopa is a genus of rather small reddish-brown, slightly pubescent flies, with the abdomen short. They exhibit certain characters associated with the more typical CONOPIDÆ and others which are associated with the MUSCIDÆ.

Table of Species.

1. First posterior cell nearly clear, but with a distinct infuscated spot in the centre; wings grey, with darker parts here and there; a distinct, small, round, black spot on either side in middle of lower part of cheek; two larger brownish spots on each side behind middle of occipital margin; femora indistinctly ringed, tibiæ with three or four distinct narrow black rings . . *picta*, Panz., p. 379.

   First posterior cell never with a central spot; wings uniformly grey or yellowish-grey, unmarked (in *testacea* the anterior cross-vein is suffused); no spots on head except near base of antennæ .. 2.

2. Legs wholly orange-brown . ... *dorsalis*, Fabr., p. 379.

   Legs always with black rings or markings . 3.

3. Abdomen wholly black; femora with a broad black median ring (sometimes much reduced); wings entirely blackish-grey, unmarked. .. .. *nigriventris*, sp. n., [p. 380

   Abdomen orange-brown; leg markings reduced to indistinct or incomplete rings on the femora, and two fairly well-defined narrow rings on hind tibiæ; wings moderately dark grey, yellowish basally, anterior cross-vein distinctly suffused .. ... *testacea*, Linn., p. 381.

M. cincta, Fabr., is not included in the table, as the description of it is insufficient.

297. Myopa picta, *Panz.*

Myopa picta, Panzer, Faun. Germ. liv, p. 22 (1798); Schiner, Faun. Austr. i, p. 386 (1862).

♂ ♀. *Head*: frons with almost parallel sides, yellowish or orange-yellow, with a few fine hairs; ocellar triangle at extreme vertex, overhanging the occiput, vertex often brown, with some long bristly black hairs; rest of head dull milk-white; mouth-border, outer margin of cheeks and occiput with long, rather shaggy, white pubescence; a distinct small round spot on either side in middle of lower part of cheek, one or two indefinite spots near the eyes, and two much larger spots on each side in middle of side margins of occiput. Antennæ dull orange-yellow, 3rd joint in profile practically circular, dead black, sometimes orange-brown in ♀; the arista is much thickened basally and is orange, with the filiform tip black. Proboscis much longer than in most species. *Thorax*: dorsum black, the slight depressions delineating the various parts more or less greyish-dusted; side margins and pleuræ orange-brown, with whitish or silvery reflections; scutellum black. There are fairly strong bristly hairs on the side margins of the dorsum and the hind margin of the scutellum, while the remainder of the surface has short bristly pubescence; pleuræ bare except for some bristly hairs on the sternopleura. *Abdomen* orange-brown with whitish reflections, and with a more or less interrupted dorsal black stripe composed of a series of fairly large black spots, one in the centre of the front margin of nearly every segment; indefinite bands of yellowish-grey dust on basal margins of hinder segments. Pubescence of abdomen short, black, bristly. *Legs* orange-brown, with whitish reflections; femora with two median black bands and generally one subapical or apical band; anterior tibiæ with three and hind tibiæ with four similar black bands; tarsi to the apex, with pulvilli and claws (except tips of latter) orange-brown. Pubescence of legs black and bristly, softer on femora (very short on upper side of middle pair), and in the tibiæ denser on the black rings. *Wings* pale grey, with anterior part, and the remainder here and there, darker; there is a conspicuous darker grey spot of some size in the nearly clear 1st posterior cell; squamæ milk-white; halteres orange-brown.

Length, 8 mm.

Redescribed from a ♂ and ♀ taken *in cop.* by Col. Nurse at Quetta, iii. 1903, and in perfect condition. This European species is recognized with ease by the peculiar dark grey spot in the 1st posterior cell, together with the conspicuously ringed legs and the two spots on each side of the occiput.

298. Myopa dorsalis, *Fabr.*

Myopa dorsalis, Fabricius, Ent. Syst. iv, p. 397 (1794); Schiner, Faun. Austr. i, p. 388 (1862).

♂ ♀. *Head*: vertex and upper part of frons brownish-orange; vertical triangle blackish; ocelli dark brown; frons towards

antennæ becoming more yellowish, with a little greyish reflection at sides; rest of head pale orange-yellow with indistinct whitish reflections. Antennæ deep orange, including the short thickened arista; 2nd joint as long as 1st and 3rd together. Occiput orange-yellow, broadly dull brown behind; vertex with a little bristly pubescence; proboscis black. Total height of head double that of eyes. *Thorax* orange-brown, dorsum distinctly blackish, the colour extending to the anterior margin; mesopleuræ and sternopleuræ with uniform whitish reflections; scutellum orange-brown, with four fairly strong black bristles on the hind border, and some smaller bristles; metanotum shining black. *Abdomen* orange-brown, with whitish dust and silvery reflections towards sides; 1st segment mainly blackish on dorsum. Pubescence of abdomen composed of fine, stiff, black hairs. *Legs* orange-brown to tips of tarsi; coxæ with silvery-white reflections; a black streak on upper side of fore femora; hind tibiæ darker at apex on inner side; pulvilli pale orange, tips of claws black. *Wings* yellowish-grey, more yellowish at base; halteres pale orange.

Length, 10 mm.

Redescribed from a single ♂ in the British Museum from Csehtelek, Bihar (*Hon. N. C. Rothschild*). A moderately common European species.

299. **Myopa nigriventris**, sp. nov.

♂. *Head* bright yellow, deeper and more orange on frons and upper part of occiput; two triangular brown marks (with their apices towards the vertex) near the upper angles of the eyes; a blackish transverse streak on frons just above antennæ; proboscis blackish-brown; antennæ, including the arista, orange, though the closely-set bristles on the 2nd joint make it appear brown; frons and occiput distinctly pubescent; there is one post-ocellar bristle. *Thorax* chestnut-brown, whole dorsum pubescent, black except at side margins; greyish dust reflections on hind margin; whitish reflections on humeri and pleuræ, especially on lower part of sternopleura; metanotum black. *Abdomen* black; 2nd segment reddish-brown towards sides, and a little white-dusted on the hind margin except in the middle; tip of abdomen dark reddish-brown, a little grey-dusted. *Legs* orange; coxæ, especially the 1st pair, with whitish reflections; femora with a broad median black ring, which leaves the tips and more or less of the base pale, and is much narrower on the under side; there is a subapical black ring on the tibiæ, more or less interrupted; upper part of outer sides of all the tibiæ with whitish reflections; pulvilli and basal half of claws orange, apical half of the latter black. *Wings* yellowish-grey, costal cell more yellowish; halteres orange.

Length, 7 mm.

Described from the type ♂ from Mussoorie, ix. 1916. *Type* sent by Mr. T. B. Fletcher to the British Museum. Two other ♂ ♂ from Kashmir, 5000–6000 ft., iv–v. 1901 (*Nurse*), have the

black femoral ring reduced to a moderately broad subapical one, otherwise they agree very closely with the type.

300. **Myopa testacea**, *L.*

Conops testaceus, Linnæus, Syst. Nat., Ed. xi. 2, p. 1006 (1759).
Myopa testacea, Schiner, Faun. Austr. i, p. 386 (1862).

♂ ♀ *Head*: vertex lighter or darker brown, often paler in middle, with some bristly black hairs; frons brownish-yellow or orange; rest of head pale yellowish, with a little concolorous pubescence on margins; there is a fair-sized, dark brown, elongate spot on each side of the frons, extending over the upper part of the face towards the eyes, and another just below it, near the eye-margin. Antennæ orange-brown. *Thorax*: dorsum black; side margins and pleuræ dark orange-brown, with whitish reflections and a little greyish dust on the sternopleuræ and other parts; scutellum rather dark brown; metanotum shining black. Pubescence of whole thorax black. *Abdomen* mainly reddish-brown or orange-brown, sometimes a little blackish at base; with yellow-grey dust-bands occasionally present on hind margins of 3rd and 4th segments, and the tip of the abdomen generally similarly dusted. Abdominal pubescence black. *Legs* yellowish-brown or orange-brown; an indefinite black subapical band on femora; two more or less distinct narrow rings on hind tibiæ, dividing the limb subequally; tips of claws and pubescence of legs black. *Wings* moderately dark grey, a little yellowish basally; anterior cross-vein distinctly but narrowly suffused; squamæ whitish; halteres yellowish-brown.

Redescribed from two ♂ ♂ taken by Col. Nurse in Kashmir, 5000–6000 ft., v. 1901, and from European examples of both sexes. This is one of the commonest European species of CONOPIDÆ, and is recorded also from Northern Africa.

301. **Myopa cincta**, *Fabr.*

Myopa cincta, Fabricius, Ent. Syst. iv, p. 399 (1794); Wiedemann, Auss. Zweifl. ii, p. 246.

"Slightly smaller than *M. ferrugineus* *. Antennæ ferruginous, tip pointed; frons vesiculose, white with a black spot on each side. Thorax obscurely testaceous; abdomen testaceous, with three very indistinct whitish bands. Legs testaceous; tips black; tibiæ rather shining silvery. Habitat in East India: Dr. Koenig."

I have not seen this species, nor has any author apparently recorded it since its discovery. Judging by the expression that the tips of the antennæ are pointed, this should be a distinct species, otherwise it might be merely a synonym of *testacea*, L.

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* = *Sicus ferrugineus*, L.

Genus **OCCEMYIA**, *Rob.-Desv.*

Occemyia, Robineau-Desvoidy, Dipt. env. Paris, Myop. p. 50 (1853).
Melanosoma, Robineau-Desvoidy, op. cit. p. 44 (1853).
Oncomyia, Loew, Berlin. ent. Zeitschr. x, p. 41, no. 73, *nota* (1866).
Thecophora, Rondani, Dipt. Ital. Prod. ii, p. 235 (1857).

GENOTYPE, *Myopa atra*, Fabr.; by designation of Coquillett (1910).

Head hardly broader than thorax, loosely attached. Epistome somewhat receding; in middle and at sides impressed, projecting distinctly below level of eyes; cheeks short, always shorter than the longer diameter of the eyes; eyes wide apart in both sexes, bare; ocelli present; proboscis thin, extremely long, bent at base and in middle, horizontal, prominent, slightly bristly, with very small labella; palpi short, cylindrical, bristly; antennæ elongate, porrect, with first two joints bristly; 1st joint short, 2nd and 3rd generally at an angle with the 1st, distinctly elongate, spatulate; 3rd as long as, or shorter than, 2nd, oval, bare, with a style-like dorsal arista. *Thorax* subquadrate with rounded corners; scutellum semicircular. *Abdomen* elongate, at base moderately narrowed, curved, arched on upper side, flat below. Genitalia in ♂ barely prominent, genital shield in ♀ large and distinct. *Legs* of moderate size and length, femora slightly thickened, hind pair slightly longer than the others, finely bristly. *Wings* with venation of the type normal in CONOPIDÆ; 1st posterior cell always open; anal cell nearly reaching margin, with long petiole.

Range. Europe, North America and the Orient.

Life-history unknown.

The imagos are compact, grey, little flies, and nearly bare. They are found on flowers and bushes.

The two Indian species may be distinguished by the colour of the legs, which are mainly black in *atra* and yellowish in *flavipes*.

302. **Occemyia atra**, *Fabr.**

Myopa atra, Fabricius, Spec. Ins. ii, p. 469 (1781).
Occemyia atra, Robineau-Desvoidy, Dipt. env. Paris, Myop. p. 58 (1853).

♂ ♀. Black, covered with ash-grey dust. Upper part of frons blackish, lower part orange, the two colours blended in the middle; face and cheeks yellowish or yellowish-white; occiput shining black, with grey dust except on upper part; the stiff hairs on the head all black, longest on upper part of frons and vertex.

* For a full bibliography and the numerous synonyms of this species, see Becker in Kertész, Kat. Paläarkt. Dipt. iv, p. 268 (1905).

Antennæ dark reddish-brown or blackish-brown, a little paler at base of the 3rd joint. There is a pair of more or less distinct, moderately wide, dust stripes on the thorax; humeri distinctly grey-dusted. The grey dust markings of the abdomen are more distinct towards the sides and on the hind margins of the segments; genitalia shining black. Legs in the first Indian specimen dark brown, nearly black, basal half of hind femora yellowish; pubescence of legs soft, black, rather long on femora. In the second Indian specimen all the legs are a little yellowish at the base. Wings very pale grey, a little yellowish at base; halteres orange.

Length, 5 mm.

Described from two Indian specimens, the first in good condition, from between Phagu and Kufri, Simla District, 8000–9000 ft., 21. v. 1916 (*Annandale & Kemp*); the second specimen from Simla, 7000 ft., 9. v. 1910 (*Annandale*). This European species is very variable, especially in the coloration of the legs. One of the above specimens has the 2nd joint of the antennæ barely longer than the 3rd, though, according to Schiner, it should be decidedly longer.

303. **Occemyia flavipes**, sp. nov.

Differing from *atra* by having the antennæ dull orange-brown with tip of 3rd joint blackish. Thorax with a narrow dorsal median stripe extending nearly from the anterior to the hind margin; there is an outer stripe on each side which spreads somewhat round the inner side of the humerus; a rather large blackish spot on each side in front of the wing-base and extending over the hinder corner of the dorsum, and a smaller one in the middle of the hind margin; all these markings are rather ill-defined. Legs mainly orange-yellow; tips of femora above, tibiæ except at base, and tarsi wholly, brownish.

Length, 4–5 mm.

Described from two ♀ ♀ from Mahableshwar, Bombay Presidency; in the British Museum. The 2nd antennal joint is only very slightly longer than the 3rd.

Family ŒSTRIDÆ.

Head rather closely set on thorax, either broader than, as broad as, or rather narrower than, thorax; generally much more prominent in front than the somewhat small bare eyes; often vesiculose and beset with wart-like blotches or dark pimples; epistome or lower part of head nearly straight or slightly receding, very broad, slightly pubescent or bare; eyes wide apart in both sexes, sometimes rather swollen; frons broader in front than behind in ♂; three distinct ocelli. Mouth-opening very small;

proboscis rudimentary or small, rarely prominent;. palpi small or rudimentary. Antennæ short, three-jointed; first two joints very short, cylindrical or cup-shaped, 3rd rounded, oval or lenticular, with bare dorsal arista: the antennæ are seated in a distinct, rounded, oval or inverted lyre-shaped cavity, which is often divided by a median ridge, the frons generally forming a conspicuous and prominent ridge along the upper side of this cavity. From the antennal cavity to the mouth-opening runs generally a median furrow of greater or less width.

Thorax oblong or oval, little longer than broad, with a distinct suture; scutellum semicircular.

Abdomen either short, in which case it is oval or cylindrical, or else moderately elongate, in which case it is generally conical; 6-segmented; genitalia in ♂ concealed; in ♀ rather prominent.

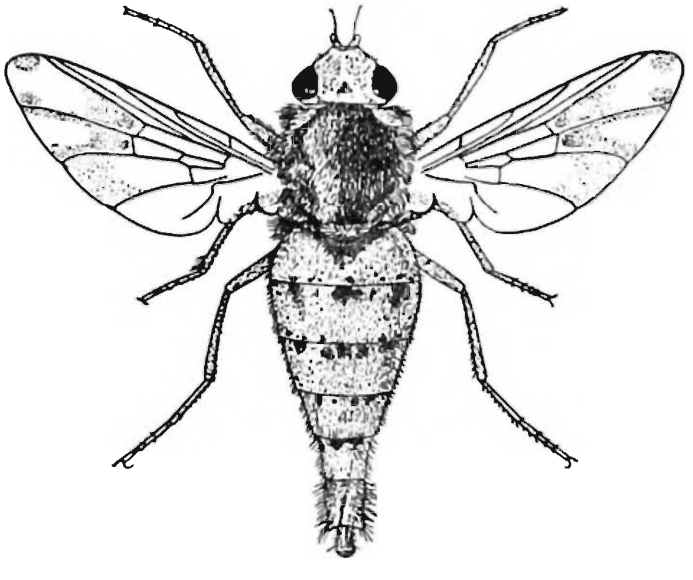

Fig. 81.—*Gastrophilus equi*, L., ♀.

Legs moderately long, rather slender; often, especially hind pair, elongate; femora at base and tibiæ in middle often rather thickened, latter sometimes cylindrical; two distinct pulvilli.

Wings with characteristic venation, intermediate between that of SYRPHIDÆ and MUSCIDÆ; surface wrinkled; 3rd longitudinal vein always simple, 4th vein running straight to wing-border (*Gastrophilus*) or more generally converging apically towards 3rd; anterior cross-vein at about middle of discal cell; the latter cell is generally present, formed either by the presence of the discal cross-vein or by the upturned apical portion of the 5th vein; 6th (anal) vein generally, 7th vein sometimes, present, often indistinct; anal cell short, generally indistinct. Thoracal squamæ either very large, or small and long haired, in either case covering the halteres.

Life-history. The family was monographed by F Brauer in 1863, and the genera were reviewed by A. Bau in Wytsman's 'Genera Insectorum' (Fascic. 43, 1906). There have been many

important recent contributions to a knowledge of the life-cycle, but these do not seem to have been as yet gathered into any one work. The life-histories are very varied and sometimes highly complicated. The larvæ live either in the nostrils, throat or stomach, or under the skin of the back of mammals, frequently of ungulates and pachyderms, leaving the host when full grown to pupate in the ground. The flies of those species that pass the larval state in the stomach of *Gastrophilus*, etc. lay their eggs on the hairs of their hosts, usually on the knees, fetlocks or shoulders, whence they are licked off by the animal, thus passing into the body. The young larvæ affix themselves by hooks near the head to the walls of the stomach, feeding probably not on the tissues but on the secretions caused by the irritation due to their presence. When fully grown they pass out with the dung. The sheep bot-fly (*Œstrus*) is said to be viviparous: it places its young larvæ just inside the nostrils of the animal, and the subsequent larval development occurs in the frontal sinuses. *Cephalomyia* lives in the nostrils of the camel. Of the forms that cause tumours under the skin the best known is *Hypoderma*. It forms tumours or warbles on the backs of cattle. The eggs are laid on the legs or, more rarely, on the flanks, and the larvæ migrate by way of the gullet and diaphragm, or sometimes *viâ* the neural canal, to the tissues beneath the skin of the back. When nearly full grown they can easily be picked out of the warbles by hand. The imago appears for only a brief period. A new species of this genus, *H. crossii*, occurs in India. *Hypoderma* occasionally attacks man, and cases of human parasitism have been recorded in *Cephenomyia* and *Gastrophilus*. The most frequent human parasite in the family is the Neotropical *Dermatobia*, which also attacks dogs and other carnivores, ungulates and rodents: in this genus the eggs are attached by the parent fly to the bodies of mosquitos (*Janthinosoma*), or possibly also of certain ANTHYMYIIDÆ which attack vertebrates, and so are carried to the hosts in whose bodies the larvæ are to undergo their development. *Cuterebra*, also an American genus, forms warbles under the skin of mice and other rodents. The larvæ of Œstridæ have transverse rows of horny hooks or bristles on their bodies. They also possess mouth-hooks, and those forms which live in the stomach of the host attach themselves to the stomach-wall by means of these mouth-hooks, and cannot be dislodged even by the passage of food or by medicinal purges. In temperate climates the winter is passed, at least in some species, in the pupal stage.

Notes on ŒSTRIDÆ in India are given in 'Indian Insect Life,' pp. 651–4 (1909), also by Col. J. W Yerbury, Journ. Bombay Nat. Hist. Soc. xiii, pp. 683–6 (1901), and by Col. C. G. Nurse, *op. cit.* xiv, p. 609 (1902)*. Col. Yerbury has also drawn attention

* See again below, p. 391.

to the reference in Colonel James Tod's "Annals and Antiquities of Rajasthan" (Book iv, Chap. 27; 1st ed., vol. i, p. 722, 1829) to the killing in Rajputana of an antelope, which, when stripped of its hide, was found to have its whole carcase covered with large white maggots. Col. Yerbury thinks that the Œstrid in this case may be the same as that described by Brauer (Mon. Œstr. p. 163) as infesting in great numbers an antelope (*Antilope dorcas*, Pall.) captured near Damascus. This insect seems to be known only in the larval state, though it has been thought to be a species of *Hypoderma*, and a footnote to that effect is given in Dr. William Crooke's recent edition of Tod's book (Oxford, 1920; vol. ii, p. 834). See also remarks below, p. 396.

Table of Genera.

1. Apical section of 4th vein running straight to wing-border, never bent upwards; 1st posterior cell therefore wide open; discal cell present or absent; squamæ small .... [p. 396. GASTROPHILUS, Leach,

   Apical section of 4th vein always bent upwards towards tip of 3rd vein, leaving 1st posterior cell narrowly open or closed; discal cell always present; squamæ very large.. . .. 2.

2. Second antennal joint conspicuously trilobed .... COBBOLDIA, Brauer, p. 391.

   Second antennal joint never trilobed . 3.

3. First posterior cell narrowly open . . HYPODERMA, Latr., p. 394.

   First posterior cell distinctly closed or even petiolate. .... 4.

4. Cheeks in profile much less deep than height of eyes; antennæ placed in a large single cavity; 3rd joint small, nearly globular, arista conspicuously thickened at base .... 5.

   Cheeks in profile much deeper than height of eyes; antennæ placed in separate cavities, the intermediate space flush with the face; 3rd joint large, lenticular, outer edge irregular, arista slightly thickened at base ... [p. 402. PORTSCHINSKIA, Semenov,

5. Venation extended distally to the normal distance; outer sides of 1st posterior and discal cells parallel with hind margin of wing ... ŒSTRUS, L., p. 387.

   Venation shortened distally, extending barely beyond three-fourths of the wing's length; outer sides of 1st posterior and discal cells at right angles to longitudinal axis of wing . [p. 389. CEPHALOMYIA, Latr.,

Genus **ŒSTRUS**, *L.*

Œstrus, Linnæus, Syst. Nat., Ed. x, p. 584 (1758), and Ed. xii, p. 969 (1767).

GENOTYPE, *Œstrus ovis*, L. ; by designation of Curtis.

Head large, semicircular, broader than thorax; frons wide in both sexes, slightly curved, vesiculose on each side, the puffed up part extending downwards, gradually narrowing to lower margin of eyes, leaving a depressed elongate triangle in middle of frons ; anterior margin of frons overhanging antennal cavity ; the latter comparatively shallow, the median ridge low or rudimentary ; under side of head bare, swollen. Antennæ short, 3rd joint longer than 1st and 2nd together, subglobular, with long bare dorsal arista ; a median shallow groove from antennal cavity to mouth-opening; proboscis rudimentary, bifid and flat at tip, slightly prominent ; palpi short, globular ; eyes half height of head, small, bare ; three distinct ocelli. *Thorax* oblong, a little longer than broad ; scutellum large, semicircular. *Abdomen* as broad as thorax, comparatively short, egg-shaped or cylindrical, obtuse at tip, with some fine long hair on venter and at apex ; genitalia in both sexes sometimes hidden, in some species prominent in ♂, with two globular knobs ; in others, the ovipositor in the ♀ lies in a groove. *Legs* comparatively weak, of moderate length, hind pair barely longer. *Wings* in rest parallel, lying against the sides of the body ; thoracal squamæ very large, bare.

Range. Europe, Asia, Africa, America, Australia.

Life-history. Larva cylindrical, narrower anteriorly, convex above, flat below ; 1st segment small and very short, mouth-hooks large, directed downwards ; antennæ short, blunt, cuticular, wide apart at base, with two apical, ocellus-like, chitinous rings ; body with two rows of tubercles on each side. The eggs or young larvæ are laid in the nostrils of sheep, goats, or antelopes ; the larvæ develop in the frontal sinuses, and when fully developed they fall to the ground and pupate under stones or in crevices in the earth.

The perfect insects are moderate sized and nearly bare, with silvery-white reflections and black or dark coloured pimple-like spots that give them a pied or spotted appearance. They are extremely inert and settle freely on walls in proximity to sheep-stalls, whence they are easily captured by hand.

304. **Œstrus ovis**, *L.*

Œstrus ovis, Linnæus, Faun. Suec., 2nd ed. p. 1734 (1761).
Œstrus ovinus, Fischer, Diss. Observ. de Œstro, Leipz. iii, pl. 2, figs. 1-5 (1787).
Œstrus nasalis ovinus, Numan, Tijdskr. v. d. Vetensk. iv, p. 133, pl. i, fig. 2 (1850).
Œstrus ovis, Brauer, Mon. Œstr. p. 151, pl. iii, fig. 1, pl. vii, fig. 10 (1863).

♂ ♀ *Head*: frons varying from dull yellowish to yellowish-brown, apart from the broad median stripe; vesiculose, wrinkled, with numerous, irregularly placed, small, shallow pits which are black at the bottom; ocelli large, shining black; a median longitudinal wrinkled brownish stripe (varying in shade) extending from the blackish ocellar spot to the lower margin of the frons, which latter projects over the antennal cavity; this cavity (which, in conjunction with the median furrow running from it to the mouth-opening, may be described as shaped like an inverted lyre) is of moderate depth, pale, almost livid, yellow. First two antennal joints pale yellowish, 3rd subglobular, black, with yellow dorsal (nearly basal) black-tipped arista. Lower sides of frons extending more narrowly to lower corners of eyes, yellowish-white with small inconspicuous pits, of which the bottoms are not black; whole of lower part of head orange-yellow, varying in individuals to nearly whitish; occiput whitish, vertical margin yellowish; an irregular row of black bottomed pits along its entire upper margin. Head bare except for a few whitish hairs on frons and some yellow ones on lower part of head. *Thorax* yellowish-grey, paler on humeri and sides; whole dorsum, and that of scutellum also, with very numerous small black tubercles or pimples, those on the scutellar margin being the largest, and each bearing a bristly hair, while the majority of the remainder bear each a pale yellow hair, curved backwards; some pale yellow pubescence on humeri and pleuræ and to a rather less extent along sides of dorsum. *Abdomen* whitish-grey with irregular blackish blotches, and almost silvery-grey reflections in certain lights; whole surface covered with minute, black, pimple-like spots, each bearing a single hair; some fine yellow hairs at sides and towards tip of abdomen, irrespective of the black spots. Venter whitish-grey, with smaller and less numerous similar black spots and more numerous fine hairs than dorsum; genitalia concealed. *Legs* orange to yellow; coxæ with grey shimmer and long soft pale hairs; femora rather swollen at base and with soft pale hairs; tibiæ and tarsi with short black bristly hairs and some rather longer soft pale hairs; pulvilli and claws orange, the latter black-tipped. *Wings* nearly colourless; veins yellowish or yellowish-brown; halteres yellowish, concealed below the very large, whitish, bare thoracic squamæ.

Length, 11 mm.

Described from a few examples in indifferent condition in the Pusa collection: Pusa, 2 & 4. viii. 1909, on sheep; "remained sitting in tube, 13. ii. to 4. iii. 1912"; iv. 1907 "in native quarters, on wall"; 14. viii. 1914, "on wall"; 12. x. 1909, "in head of living kid"; "A. H., Case no. 811," 10. x. 1912; Chapra, Bengal; Larpore, Saran District, Bengal.

Distribution almost world-wide: the insect is widely-spread in Europe; recorded also from Asia, Africa, North and South America, and Australia.

Genus **CEPHALOMYIA**, *Latr.*

Cephalemyia, Latreille (emend. Brauer), Fam. Nat. Règne Anim. p. 497 (1825).
Cephalemyia, Macquart, Dipt. Exot. ii, part 3, p. 25 (1843).

Head vesiculose; frons in ♂ narrower than in ♀; cheeks narrow; lunule broadly lunate above, narrowing gradually downwards towards mouth-border. Foveæ well developed, broadly separate; antennæ very small, 1st and 2nd joints cup-shaped, 3rd lenticular, slightly curved on inner and upper sides; arista rather long, bare. Eyes separated; 3 ocelli. Epistome broad in front; cheeks swollen, vesiculose; mouth-opening shallow. Proboscis rudimentary, flat and bifid at tip; palpi small, globular. *Thorax* nearly quadrate. *Abdomen* short, tip truncated. *Legs* short, simple. *Wings* rather small, longer than abdomen; auxiliary vein ending just before middle of wing, 1st vein at middle or just beyond, 2nd at about three-fourths the length of the wing; 3rd vein upturned at tip, ending a little beyond tip of 2nd; 4th upturned at tip rather abruptly, strongly bisinuate, closing 1st posterior cell and ending in the 3rd vein just before its tip; anterior cross-vein at about middle of discal cell, slanting outwards; discal cell closed by presence of discal cross-vein; 5th vein becoming suddenly weaker at tip of discal cell but running straight though weakly to wing-margin; anal cell distinct, as long as 2nd basal; anal vein beyond tip of anal cell very weak; squamæ large.

Range. The only species now left in this genus extends over South Europe and North Africa, and occurs in India. It has also been bred at Aden by Col. Yerbury, who moreover states (*in litt.*) that it occurs in Palestine and Mesopotamia.

Life-history. The larva is said to live in the nasal organs of Tylopoda (camels) and Cavicornia (buffaloes), but Dr. Bau doubts the authenticity of the latter statement. The larva is broader in front than behind; mouth-hooks large, directed downwards; between them is a small swelling; antennæ wide apart at base, shortly conical, situated near the mouth-hooks, with an eye-like, chitinous ring at tip. There are four semi-globular warts above and near the antennæ; similar, often indistinct warts towards sides of segments. Segments with a girdle of large, soft, conical, thorny warts. Stigmatic plates placed in a narrow depression of the last segment, lunate or kidney-shaped, with the false stigmatic opening let into the inner side of the plate. Pupa very convex above, concave below; posterior stigmatic plates hidden.

305. **Cephalomyia maculata**, *Wied.*

Œstrus maculatus, Wiedemann, Auss. Zweifl. ii, p. 256 (1830).
Œstrus libycus, Clark, Trans. Linn. Soc. London, xix, p. 93 (1843).
Cephalomyia maculata, Brauer, Mon. Œstr. p. 163, pl. iii, fig. 4, pl. vii, fig. 9 (1863).
? *Œstrus titillator*, Clark, Essay on Bots, Suppl. ii, pl. ii, fig. 22 (116).

♂ ♀. *Head*: frons and face with nearly parallel sides, gradually narrowing from above downwards, more than half the width of the head in the ♂, much broader in the ♀; upper part best described as dull greenish-grey, having on each side three rather bright, orange-brown, elongate spots narrowly outlined with whitish-grey; vertex and post-ocular margins brownish-orange; ocellar spot black; ocelli distinct, black; lower part of frons pale grey with two (or perhaps three) small orange-brown spots on each side, contiguous to eyes; a broad median stripe (slightly wrinkled longitudinally) extends from the ocellar spot (where the stripe divides and gradually disappears on each side before attaining the vertex) to the antennal cavity; this stripe is blackish on its upper half and brownish-orange on its lower half; anterior margin of frons not in any way elevated into a ridge above antennal cavity; latter pale livid white, deep enough to contain the antennæ wholly, with a high median ridge; face and cheeks wholly pale livid white; antennæ with first two joints very small, pale yellowish; 3rd globular, bright orange-brown, with concolorous dorsal, nearly basal, arista; a very narrow groove runs from the lower part of the antennal cavity to the mouth-opening; occiput very concave, blackish, with margins orange-brown; whole head entirely devoid of pubescence. *Thorax* with dorsum mainly rather dark chestnut-brown, having four black longitudinal stripes, interrupted at suture; the two median stripes nearly reach the anterior margin, but the outer stripes are shortened in front; margins of dorsum broadly yellowish-grey; whole dorsum more or less dusted with golden-yellow: scutellum very large, bluntly triangular, chestnut-brown, with a large round black spot on each side; a few very short black hairs are present on the humeral region and about the bases of the wings; sides of thorax yellowish-grey or brownish-grey with some longer golden pubescence. *Abdomen** short, narrower than the thorax, cylindrical with obtuse tip; ground-colour silvery-white, 2nd segment with large, irregular, sinuate, blackish spots; 3rd segment with a few such spots situated laterally in front and with some on the hind border, so that the latter appears alternately silvery-white and black; rest of segments clear silvery-white; 5th segment broad and round; 6th small, sickle-shaped; venter silvery, less spotted. *Legs*: coxæ apparently grey, with little greyish or yellowish hair; rest of legs orange or brownish-yellow with two broad but interrupted blackish bands on the femora and two broad bands on the tibiæ; femora with softer and longer pubescence below, tibiæ and tarsi with a little shorter yellow pubescence and tiny bristles towards the tips of the tibiæ and of each tarsal joint†. *Wings* nearly colourless, pale brownish-yellow; venation

* The abdomen is discoloured in the specimen described herein, so the description of this part of the insect is drawn from Brauer's Monograph.

† Brauer's description of the legs gives two dark rings on the femora, but they are by no means definite on the specimen herein described; they would be better defined as a narrow, interrupted basal ring and some long, broad streaks on the apical half.

as stated in generic diagnosis, upturned apical part of 4th vein closing 1st posterior cell, strongly bisinuate and narrowly or deeply suffused, the colour extending to the tips of the 2nd and 3rd veins and the costa; anterior cross-vein narrowly suffused; a minute black dot at the tip of the vein which closes the discal cell.

Length, 8 mm.

Described from one specimen in the Pusa collection, from the nostrils of a camel at Sohawa, x. 1913. One ♂ and two ♀ ♀ in the British Museum, bred from larvæ sneezed from the nostrils of a Bactrian camel in the Zoological Gardens, Regent's Park, agree very closely, but have the frons and upper part of the head more orange. For distribution see under the genus.

Some very interesting notes on this species as a parasite of the camel are given by Col. Yerbury and Col. Nurse (Journal Bombay Nat. Hist. Soc. xiii, p. 683; xiv, p. 609 respectively). The larvæ when about full grown are squeezed out of the nostrils by the camel, usually in February or March, and they then pupate in the ground. They may easily be bred in small pots or similar receptacles with a few inches of earth, sawdust or leaves, the emergence of the imago occurring about ten days after pupation. Larvæ of this species are not uncommon at stations where camels are numerous, but the adult fly seems to be only very rarely seen in a wild state. It has been bred by Col. Yerbury at Aden and by Col. Nurse at Quetta.

Genus **COBBOLDIA**, *Brauer*.

Cobboldia, Brauer, Denkschr. Ak. Wiss. Wien, lxiv, p. 262, pl., figs. 1–18 (1897).

Head nearly as broad as thorax. Eyes rather small, bare, with all facets of uniform size, small. Frons in both sexes broad, linear, nearly half the width of the head in ♂, over half in ♀, flush with eyes on vertex, flat, very large and prominent in front, sloping gradually to base of antennæ. Head in profile descending below eyes for a distance equal to about half their length; face restricted almost to the cheeks through the extraordinary size and depth of the foveæ. Antennæ set below the slightly projecting front margin of the frons; 1st joint very small, apparently annular; 2nd moderately large, irregularly cup-shaped but with the margin forming three distinct lobes; 3rd joint large, comparatively thick, oval; arista bare; proboscis short, cylindrical, with the sides of the groove fused together at the base, produced at the apex above into a stylet-like upper lip, to which the semicircular labella fit closely beneath. Occiput not extended behind eyes in profile. The whole head is bare except for a little soft pubescence on the vertex and on the under side, and a few fine hairs on the frons. *Thorax* almost broader than long, slightly arched, slightly narrower in front, with anterior corners rather angular; scutellum semicircular, of moderate size. *Abdomen*

about as long as thorax and scutellum together, as wide at base as widest part of thorax; oblongo-conical, moderately arched, composed of four obvious segments of about equal length, with apparently a hidden 5th segment in ♂ (apart from the genitalia, which are concealed) and a definite 5th segment in ♀. *Legs* of moderate size and rather slender. *Wings* transversely wrinkled; auxiliary vein ending at about middle of wing; 1st, 2nd and 3rd veins ending at about equal distances from each other, the latter a little before the wing-tip; 1st posterior cell open; anterior cross-vein at a little before middle of discal cell, and much before tip of auxiliary vein; 5th vein running weakly to wing-margin; 2nd basal cell and anal cell subequal, both very short; 6th and 7th veins distinct, not reaching wing-margin. Alulæ large, conspicuous, alar squamæ comparatively small; thoracic squamæ very much larger, wrinkled.

The above is partly abbreviated from the very voluminous description by Brauer, and partly drawn from a ♂ and ♀ in the British Museum.

Life-history. Bred from larvæ from the alimentary canal of the Indian elephant.

Range. India (*C. elephantis*): probably also Africa, as larvæ of one or two species, the adults of which are not known, but which are believed to belong to this genus, have been found in the African elephant (for references, see Bau, 'Genera Insectorum,' Fascic. 43, p. 9).

306. Cobboldia elephantis, *Cobbold.*

Cobboldia elephantis (adult), Brauer, Denkschr. Ak. Wiss. Wien, lxiv, p. 266, pl., figs. 1–18 (1897).

Gastrophilus elephantis (larva only), Cobbold, Journ. Linn. Soc. London, Zool. xv, p. 333 (1881); id., Trans. Linn. Soc. (2) ii, Zool. p. 246 (1882).

Cobboldia elephantis (larva only), Brauer, Wien. Ent. Zeit. vi, pp. 217–223, pl. iii, figs. 1–6 (1887).

♂ ♀ *Head* nearly as broad as thorax, prominent in front; frons and face receding gradually, both with nearly parallel sides, about half the width of the head; bright red-orange, bare except for a few fine hairs at sides of frons; at vertex barely above level of eyes; with some whitish reflections on head generally; ocellar triangle small, black, placed on extreme vertex, with a little short black hair; ocelli dull orange, small and inconspicuous. Antennæ wholly bright red-orange, 1st joint extremely short, annular, almost hidden by anterior margin of frons, 2nd approximately cup-shaped but with irregular outline, 3rd oval, about 1½ times as long as broad, with a rather short, black, basal arista, which is orange at the base. Foveæ very deep, pale yellow. Mouth-opening and the shining proboscis black. There are some short black hairs on the lower part of the head. Occiput black, with short black bristly hairs, a little orange behind vertex and on

lower part. In ♀, the frons slightly wider than in the ♂ *Thorax* a little narrowed in front, shining black, finely punctate and with fine bristly hairs directed backwards; suture distinct; posterior corners of dorsum well developed; scutellum of medium size, rounded, covered with black pubescence; pleuræ with long, fine, black hairs. *Abdomen* at base as broad as thorax, slightly

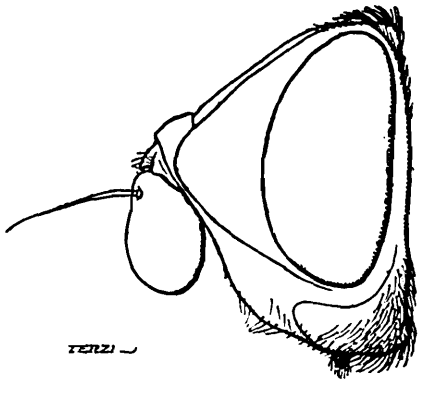

Fig. 82.—*Cobboldia elephantis*, Cobbold, profile of head.

narrowing to the rounded tip; a little longer than thorax, wholly shining black, finely punctate, with similar pubescence to that of the thorax. Venter black, creamy-yellow round the genital region and at the tip. *Legs* black; pubescence short, black and inconspicuous except on the femora, where it is of moderate length. *Wings* very dark brown, wrinkled; auxiliary vein ending at about

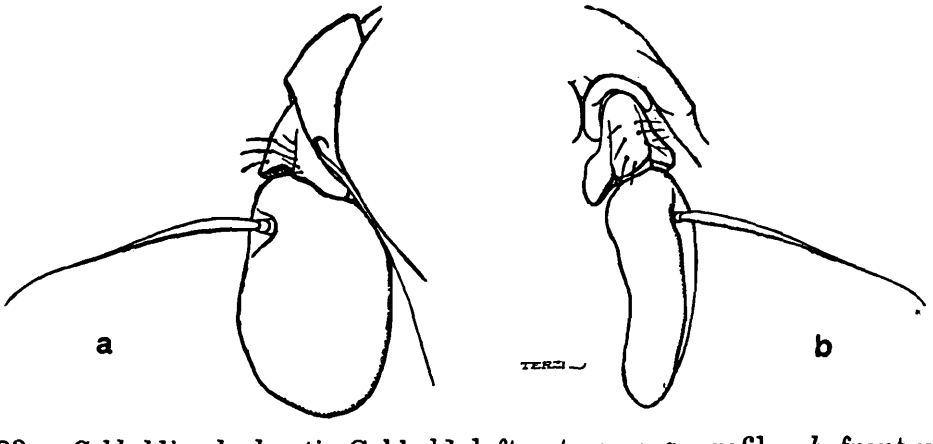

Fig. 83.—*Cobboldia elephantis*, Cobbold, left antenna: *a*, profile; *b*, front view.

middle of costa; 1st, 2nd and 3rd veins all considerably approximated, ending at about equal distances from each other, the 3rd at a little before the wing-tip; anterior cross-vein much before tip of auxiliary vein, placed rather before middle of discal cell; 1st posterior cell distinctly open; last section of 4th vein curved inwards a little and with a sharply rounded angle at the flexure; discal cell with outer side bisinuate, its anterior margin much shorter than hinder side of 1st posterior cell; 5th vein not

reaching wing-margin; 2nd basal and anal cells subequal; anal and axillary veins distinct, not reaching wing-margin. Alulæ conspicuously milk-white, standing erect when the wings are folded. The comparatively small alar squamæ and the very large thoracic squamæ are milk-white, with pale yellow margins and a microscopic fringe. Halteres dull yellowish, with darker knobs.

Length, 15 mm.

Redescribed from a perfect ♂ and ♀ in the British Museum, presented by Dr. F. Brauer. They were bred in the Zoological Gardens, near Vienna, from larvæ passed by an elephant which had recently arrived from Bangalore, South India.

Genus **HYPODERMA**, *Latr.*

Hypoderma, Latreille, Fam. Nat. Règne Anim., p. 507 (1824).

Head generally broader than thorax; vertex rather flat; frons slightly but broadly prominent; cheeks very narrow, vesiculose; antennal foveæ separated by a narrow ridge. Antennæ very short, reposing in grooves (foveæ); 1st joint small, 2nd bowl-shaped, almost encircling the nearly globular 3rd joint; arista bare, generally thick, short, rarely long and thin. Mouth-opening small, proboscis membranous, straight, withdrawn; palpi absent. *Thorax* nearly spherical. *Abdomen* generally narrower than thorax; 5th segment in ♂ triangular, curved ventralwards; last ventral segment before the genitalia bilobed, showing two flat, broad shields; ovipositor in ♀ 4-jointed, telescopic. *Legs* long and slender; tibiæ thin, slightly curved and a little thicker about the middle; pulvilli very large. *Wings*: apical cross-vein present, more or less in a line with the posterior cross-vein, which latter is parallel with the hind border of the wing.

Range. Europe, Asia, Africa, North America.

Life-history. The larvæ form warbles under the skin of the back in the horse, in oxen and deer, antelopes, goats and other animals. See also p. 385.

307. **Hypoderma crossii**, *Patton.*

Hypoderma crossii, Patton, Ind. Journ. Med. Res. x, p. 574, pls. xxx, xxxi and text-figs. 1–4 (♂ and ♀ adults, wing, larva, and perforated goat-skin) (1922).

♂. Length 11·5–12 mm. General colour olive-green with grey, brown and golden hairs. *Head* 4 mm. wide; eyes large, somewhat approximated, inner margins converging towards vertex and diverging towards face; upper and middle facets larger than lower facets; ocellar plate elongated, shaped like an isosceles triangle with apex downwards; frons covered with light brownish hairs; ptilinal suture well marked, forming a wide slit, its lower edges uniting and coalescing with the ridge which separates the antennal pits; cheeks dirty grey, covered with light grey hairs; antennal pits widely separated, shining black, as is also the upper

surface of the epistome, which forms a large, heart-shaped plate, covered with short grey hairs; 3rd segment of antennæ shining black, large and appearing globular (somewhat shrivelled in the specimens); arista arising from the upper and outer surface, directed outwards and downwards, narrowing to a rather blunt apex, bare, its basal portion stout; proboscis not visible, and no traces of palpi; lower part of face broad, elongated and thickly covered with light grey hairs. *Thorax* a little longer than broad; ground-colour dark brown with two somewhat indistinct narrow black stripes, better marked in front of the suture, converging slightly in front and diverging a little towards the suture; behind the suture the stripes are broader and end about half way to the scutellum; mesopleura covered with long greyish-yellow hairs forming a conspicuous tuft; dorsal surface of thorax covered with short dark brown hairs but without any black shining tuberosities as in the ♂ of *H. diana*; scutellum prominent, bifid, its extremities forming prominent shining black bosses, with a tuft of bright orange hairs between them. *Abdomen*: the true 2nd segment is black, without any hairs; first apparent (true 3rd) segment 1·5 mm. long, thickly covered with long golden hairs, prominent on upper surface and at sides; 2nd apparent (true 4th) segment about as long as the apparent 1st and sparsely covered with hairs; 3rd apparent (true 5th) segment narrower and clothed with similar hairs; 4th apparent (true 6th) segment smaller and hidden under apparent 3rd; external genital armature concealed. *Legs* long; femora dark brown, broad and covered with light and dark brown hairs, their apices light brown; tibiæ more slender, similar in colour and also provided with hairs, with two rather short black bristles at the sides of the inner surface of the lower end, which is lighter brown in colour; tarsi light brown, 1st segment equal in length to the three succeeding segments together, the two apical segments darker in colour; claws black, long, curved and markedly pointed; pulvilli well developed. *Wings* dark yellow with numerous ribs along the posterior border; venation shown in text-fig. 1 (Patton, *op. cit.*); anterior cross-vein thickened, forming a dark spot with a short appendix on each side; 4th longitudinal vein with a very short, upwardly-directed appendix just in front of the discal cross-vein; a clear line runs outwards from the outer appendix of the anterior cross-vein; there is a minute light spot on the costa just before its termination; halteres brown; squamæ well developed, large, greyish-yellow.

♀. Length 12 mm., including the partially extended ovipositor. General colour light olive-green with brown and golden hairs. *Head*: eyes widely separated; frons nearly twice the width of the eye; inner and posterior margins of eyes meeting at a point about level with the lower end of the ocellar plate, which is heart-shaped; ocelli amber-coloured; frontal stripe reddish-brown, narrow, widening just above antennæ; parafrontalia dark grey with yellow pubescence and brown hairs; ptilinal suture as in ♂; 3rd segment of antennæ larger than that of ♂, black,

deeply set in a pit, disc-shaped; arista arising from upper and outer side; epistome pale yellow with light hairs; cheeks and face covered with long silky hairs. *Thorax* dark brown with four very indistinct broad black stripes separated by lighter stripes, otherwise similar to that of the male; mesopleura with a similar tuft of hairs; scutellum less bifid than that of ♂, its two extremities not forming such prominent bosses; the tuft of orange hairs between the ends is smaller. *Abdomen* with ochraceous spots in middle of sides of first three apparent segments, giving the dorsal surface of the abdomen a tessellated appearance; 4th apparent segment dark olive-green; all the segments covered with light and dark brown hairs, better marked at the sides; ovipositor stout, black, without any apparent segmentation; legs light brown, much lighter than in ♂; femora with basal two-thirds dark brown, apical third light brown; middle and hind femora with only the apical third dark; tibiæ light brown; 2nd, 3rd and 4th tarsal segments with a small dark spot at their apices. *Wings* similar to those of ♂ except that there is no appendix to the anterior cross-vein and the 4th longitudinal vein; halteres and squamæ as in ♂.

The above description is taken from that of Major Patton, with some slight verbal alterations, and changes in the terminology of the wings, made to bring it into conformity with the rest of this volume. Major Patton gives figures of the dorsal and ventral surfaces of the nearly full-grown larva and adds notes on the early stages, suggesting the possibility of the imago laying her eggs on the long hairs on the goats' sides and of the larvæ entering the skin directly, without passing through the mouth and gullet. Captain Cross stated that he never found any eggs on the hairs of the legs of the goats.

This species was previously referred to by Major Patton (Bull. Ent. Res. xii, p. 248, 1921) as possibly *H. bovis*, from the skins of goats in the Punjab. In "Indian Insect Life," p. 653 (1909), the genus *Hypoderma* is said to be a suspected habitant of Western India, from the Punjab as far south as Gujerat: and warbles are also said to have been seen in Bengal cattle, but almost exclusively from the hills. See also remarks on warbles in antelopes (*ante*, p. 386).

Originally described from three ♂ ♂ and one ♀ bred from larvæ obtained from warbles in the skins of goats from the Jhelum District, Punjab. In this district a very high proportion of the goats have warbles. *Types* and paratypes in Major Patton's collection.

Genus **GASTROPHILUS**, *Leach.*

Gastrophilus, Leach, Mem. Wern. Soc. Edin. ii, p. 568 (*Gasterophilus*) (1817).
Gastrus, Meigen, Syst. Beschr. iv, p. 174 (1824).
Enteromyza, Rondani, Dipt. Ital. Prod. ii, p. 20, *nota* (1857).

GENOTYPE, *Œstrus equi*, Clark; by designation of Curtis.

Head rather short, sometimes distinctly narrower than thorax, semiglobular, vesiculose; cheeks puffed up, thinly haired; eyes rather small, bare, wide apart in both sexes; frons generally with a median impressed line; three distinct ocelli; antennæ seated in a single heart-shaped cavity, bisected by a median ridge; first two joints very small, 3rd oval, compressed, projecting beyond the cavity, arista dorsal, bare; mouth-opening small, rounded; proboscis very rudimentary; palpi small, short, globular; a median impressed line extends from the antennal cavity to the mouth-opening. *Thorax* oval, short, gently curved; thoracal squamæ small, long-haired. *Abdomen* variously shaped, generally oval or subconical; in some species much broader than thorax. Genitalia in ♂ inconspicuous, in ♀ sometimes small, generally prominent, elongate, often conspicuously so, curved under the abdomen, differing in shape and size according to the species; apical part of ovipositor cylindrical, grooved on upper side. *Legs* moderately long, comparatively slender; pulvilli large, claws slender. *Wings* with characteristic venation; 4th longitudinal vein nearly reaching border of wing, quite straight; 1st posterior cell widely open; discal cell as long as or hardly longer than anterior basal cell, in some species open; anal cell short.

Range. Europe, Asia, Africa and America.

Life-history. The larva lives in the stomach of the horse or other EQUIDÆ, passing out with the dung when mature and pupating in the ground, under stones or in holes in the earth; the insects live some months in the larval stage; the pupa takes the form of a contracted larva. The larva is pointed at the front end; the 1st (cephalic) segment is provided with two large mouth-hooks; the 3rd to the 12th segments possess rows of spines or bristles on the front borders. The perfect insects are sometimes found in numbers on bare mountain-tops, or in high towers or trees, but are usually uncommon; they are usually moderately or densely pubescent, furry species and are, especially in the hot sun, very rapid on the wing.

G. equi is easily known by the smoky band, sometimes indistinct, across the middle of the wings, which in *G. nasalis* are quite clear. *G. pecorum* may be distinguished by having the discal cell wide open, this cell being closed in the other two species.

308. **Gastrophilus equi**, *Clark*. (Pl. VI, fig. 14.)

Œstrus equi, Clark, Trans. Linn. Soc. Lond. iii, p. 226, pl. xxiii, figs. 7–9 (1797).
Œstrus bovis, Linnæus, Faun. Suec. ii, p. 1730 (1761).
Œstrus intestinalis, De Geer, Ins. vi, p. 291, pl. xv, figs. 13–19 (1776).
Œstrus hæmorrhoidalis, Gmelin (*nec* Linnæus), Syst. Nat. v, p. 2810 (1788).
Œstrus gastricus, Schwab, Die Œstraciden, p. 31 (1840).
? *Œstrus antilopes*, Pallas, Itin. i, App. p. 475 (1779).
Œstrus bengalensis, Macquart, Dipt. Exot. ii, part 3, p. 25 (1843).

♂ ♀. *Head* as broad as thorax; frons measured across middle of eyes, rather more than half width of head, distinctly narrowed on upper and widened on lower part, pale yellowish or yellowish-white, with two broad lighter or darker brownish-yellow stripes generally filling most of the surface except more or less narrowly on the eye-margins, on a space round the ocellar spot, a very narrow median line (sometimes absent) and a semicircular space above the antennal cavity; whole frons covered with fairly short, pale yellowish pubescence, the upper half of the darker stripes often with dark brown or nearly black pubescence. Ocellar spot rounded, black, with moderately long, pale pubescence; the ocelli distinct; cheeks and lower part of head pale brownish-yellow, with shorter, pale yellowish pubescence. Antennæ set in a deep, yellowish-white cavity, which is divided into two spaces by a narrow median ridge; 1st and 2nd antennal joints more yellowish, with yellow bristly hairs, 3rd joint more brownish, arista concolorous, long. Occiput brownish-yellow; eyes bare, black; sides of head below eyes nearly as deep as vertical height of latter. *Thorax*: ground-colour brownish-yellow, centre of dorsum always much darker, varying from brown to nearly black; humeri yellowish, the whole dorsum covered with dense brownish-yellow pubescence varying in shade, often brown in centre of dorsum and pale yellow towards sides and over humeri, where it is longer and almost scale-like. Scutellum concolorous with dorsum, with dense erect pubescence, of which that on the margin is dark brown and conspicuously erect. Sides of thorax concolorous, with long bushy, almost scale-like pubescence. *Abdomen* brownish-yellow, generally with small darker spots, of which three are usually found at base of each segment except the 1st, thus forming three more or less obvious dorsal rows; whole dorsum with bright yellow, rather short, somewhat depressed pubescence. Genitalia in ♂ inconspicuous, concolorous; in ♀ considerably elongate, conspicuous, darker brown, with a few pale hairs. *Legs* uniformly brownish-yellow with short yellow pubescence; 2nd, 3rd and 4th tarsal joints much shorter than 1st and 5th. *Wings* grey, veins pale brownish or yellowish; a pale smoky, indistinct band across middle of wing, and two smaller, roundish spots, one just beyond tip of 2nd longitudinal vein, the other over, or just before, tip of 3rd; hind margin sometimes just perceptibly darker.

Length, 12–16 mm.

Described from over forty specimens in the Pusa collection, all females except three. Lahore, 29. x. 1909, 1. ii. 1909 ("horse, caught from Suria infested area"); Delhi, 26. vii. 1912; Rawalpindi, 19, 22 & 24. x. 1911; Batala, 1. ii. 1909; Gurdaspur, 25. x. 1909; Shahabad, 2. xii. 1908; Purneah, 6, 10 & 12. ix. 1908; 12. x. 1908; Shahjahanpore, 3. xii. 1908; Bhagalpur, 10. iv. 1908. One specimen from Seistan, Persia, "from horse, uncommon," 3. x. 1906. Also occurs over the greater part of

Europe, North Africa, North America and at the Cape of Good Hope.

Life-history. Larva 11-segmented, all except the last two segments with a double row of horny bristles. The ♀ imago hovers almost perpendicularly in the air, and barely settles as she deposits an egg on one of the hairs of the host, to which it adheres. Four to five hundred eggs are known to have been deposited on a single horse, generally inside the knee or on the fetlocks, but always only on those parts of the body that the horse can reach to lick. After four or five days on the hairs, the slightest application of heat and moisture is sufficient to cause the larva to emerge *. When transferred by the animal's tongue to the mouth and thence to the stomach, they affix themselves to the inner membrane by two small hooks, and are believed to feed on the secretions caused by their presence. A hundred have been found in a single horse.

Form **bengalensis,** *Macquart.*

I can perceive no difference between the Indian examples described above, and typical *equi* in the British Museum and from other sources, except that the colour is generally paler yellow. Macquart's only two specific characters (of *bengalensis*), "3rd antennal joint brown" and "abdomen without dorsal spots," are not reliable, the antennæ being variable in colour, whilst the irregular rows of brownish marks, often forming bands, at the bases of all the middle segments, though nearly always present and very distinct in specimens with the pubescence somewhat worn, are sometimes quite absent. Van der Wulp also considered *bengalensis* as a synonym of *equi.* This pale form (*bengalensis*) is represented in the British Museum from widely separated localities: Bareilly, 1905 (*Major E. Jennings*); India (*Bombay Nat. Hist. Soc.*); Chaman, Kojak Pass, Afghanistan, 28. vii. 1880, "at mess, 11 P.M." (*Col. Ch. Swinhoe*); Mesopotamia; Cyprus; and several localities in South Africa.

309. **Gastrophilus nasalis,** *L.*

Œstrus nasalis, Linnæus, Syst. Ed. Nat. x, p. 590 (1758).
Œstrus veterinus, Clark, Trans. Linn. Soc. Lond. iii, p. 328 (1797).
Œstrus salutiferus, Clark, Essay on Bots, p. 33, pl. i, figs. 26, 27, 33–46 (1815).
Gastrus clarkii, Leach, Eprob. Ins. p. 2 (1817), and Mem. Wern. Soc. ii, p. 568 (1818).
Gastrus jumentorum, Meigen, Syst. Beschr. iv, p. 179 (1824).
Gastrus salutaris, Meigen, op. cit. p. 176 (1824).
Œstrus duodenalis, Schwab, Die Œstraciden, pp. 35, 37 (1840).
Gastrus nigritus, Zetterstedt, Dipt. Scand. iii, p 981 (1844).
Gastrus subjacens, Walker, List Dipt. Brit. Mus. iii, p. 687 (1849).

* Even the moistened palm of the hand is, according to Clark, sufficient to hatch them easily.

♂ ♀. *Head* as broad as thorax; in ♂, frons, measured along middle line of eyes, slightly less than one-third width of head, distinctly broader above than below, brownish-orange, as are also the face and under side of head; all wholly covered with bright golden-yellow, moderately long and dense pubescence; ocellar spot blackish, with golden-yellow pubescence; first two joints of antennæ yellowish, 3rd reddish-brown, as is also the anterior margin of the frons, overhanging the antennal cavity; occiput brownish-orange with concolorous pubescence; eyes dark chestnut-brown. In ♀, frons distinctly less than half width of head, narrower above and broader below, brownish-orange, as are also the face and lower part of the head; eye-margins broadly, antennal cavity and a small semicircular space above it, livid yellowish-white, almost translucent. The whole head, including the brownish-orange occiput, with sparse, short, yellowish hairs; ocellar spot brownish, rounded, with a few short yellowish hairs, with a narrow black transverse stripe behind it on the vertex; in all else as in the ♂. *Thorax* in ♂ wholly brownish-orange, covered with dense, long, bright orange pubescence; scutellum similar, lower margin conspicuously bare. In ♀, moderately shining black; humeri, posterior calli and parts of pleuræ darker brown, all with dense yellowish-grey, almost greenish-grey, pubescence; some blackish-brown stiff pubescence on each side of dorsum just behind suture and a fan-shaped bunch of long grey pubescence on either side behind posterior calli. Scutellum dark brown, with brownish-grey pubescence and a quantity of very erect strong blackish-brown pubescence on hind margin. *Abdomen* as broad as thorax, narrowed (especially in ♀) towards tip. In ♂, first two segments blackish (possibly, though apparently not, discoloured), remainder moderately dark shining chestnut-brown; all covered with rather dense, bright orange pubescence, which is considerably paler on 1st and 2nd segments. Venter concolorous, and with pubescence similar, but developed to a less degree. In ♀, moderately shining, very dark mahogany-brown, nearly black; sides of segments more or less chestnut-brown; basal segment with moderately dense, rather long, pale yellowish-grey pubescence; remaining segments with shorter, sparse, depressed, whitish pubescence; venter mainly dark brown, with rather long yellowish-grey pubescence; genitalia shining reddish-brown. *Legs* in ♂ brownish-orange; femora blackish except at tips, with long brownish-orange pubescence, except on upper sides, where the pubescence is very short; tibiæ with fine yellow hairs, shortest on inner side; claws and pulvilli yellowish-orange, tips of former black; anterior metatarsi not so long as, hind metatarsi a little longer than, remaining four joints together. In ♀, coxæ and trochanters reddish-brown to brownish-orange, sometimes more or less blackish in front, with bristly black hairs intermixed with more numerous, yellowish-grey, longer hairs. Femora dark brown, except rather narrowly brownish-orange at base and tip;

fore pair with sparse, moderately long, grey pubescence on inner side, dense, shorter, grey pubescence on upper, and dense, short, black pubescence on outer, side; posterior femora with mainly yellowish-grey or brownish-grey pubescence, longest on hinder side of middle pair. Tibiæ and tarsi brownish-orange, former a little darker towards tips; pubescence mainly yellowish, some stiff black hairs on upper side of tarsi (and also in one specimen towards tips of hind tibiæ on inner side); metatarsi as long as remaining four joints together, 5th joint about as long as 2nd; fore tarsi relatively shorter. *Wings* pale grey, nearly colourless, veins brownish-yellow; alar and thoracic squamæ whitish, with pale yellow borders, latter with a long fringe of whitish hairs.

Length, 13–14 mm.

Described from a single ♂ from Austria, and three ♀ ♀ in the Indian Museum from Rawalpindi, 25. x. 1913, 15. x. 1911 and 19. x. 1912. In the British Museum are examples from Kuala Lumpur (Federated Malay States), 1910 (*Dr. A. J. Stanton*), from England, Siberia, Macedonia, Nova Scotia, Jamaica and Cape Colony. It occurs in most of Europe, and in North America. The biology is discussed by Brauer, Mon. Œstr. p. 89.

The conspicuous difference of appearance in the sexes is remarkable, but the species is easily distinguished from *G. equi* by the black femora and clear wings.

310. **Gastrophilus pecorum**, *Fabr.**

Œstrus pecorum, Fabricius, Ent. Syst. iv, p. 230 (1794).
Gastrophilus pecorum, Schiner, Faun. Austr. i, p. 391 (1862).

Head. ♂: frons almost flush with eyes on upper part and only slightly prominent below; at vertex barely one-fifth the linear diameter of the head, with almost parallel sides for a short distance but slightly widening at the extreme vertex; lower part very rapidly widening to about half the width of the head at the level of the antennæ; irregularly coloured, mainly brown with yellowish and grey parts, wholly covered with long and moderately dense, bright yellow pubescence; ocelli pale yellowish-white, large, close together but not contiguous, on extreme vertex; extreme anterior margin of frons yellow; head extending below eyes for a distance equal to about height of eyes, yellowish, under side wholly covered with long and dense, very bright golden-yellow pubescence, which extends as a thick fringe round the eye-margins and over all the dark grey occiput; antennæ entirely orange-yellow, with yellow pubescence, arista black; eyes quite bare. In ♀, frons at vertex much more than one-third width of head, rapidly widening to much more than half width of head at level of antennæ, the pubescence much shorter and sparser and more

* For a number of synonyms, see Kertész, Kat. Paläarkt. Dipt. iii, p. 597 (1907).

brownish than in ♂; face and lower part of head more brownish than in ♂, pubescence much shorter and less dense; antennæ also more brownish. *Thorax* black; humeral space clearly defined, pale yellowish; whole surface, including sides, covered with long and dense, bright yellow pubescence, which is slightly darker on the dorsum and more brownish on the scutellum; some nearly whitish pubescence between scutellum and wing-base. In ♀, pubescence much shorter, and greenish-grey in colour. *Abdomen* honey-yellow, with long and dense, pale yellow or golden-yellow pubescence, extending unbroken over sides and venter, though through it the emarginations of the segments are distinctly visible. In ♀, abdomen wholly black; pubescence very sparse, almost absent except for an obvious band of yellowish-white hairs across middle of 2nd segment; venter in ♀ black, with numerous small wart-like bumps. *Legs* in ♂ pale brownish-yellow, with rather long and thick, bright yellow pubescence on under side of femora; tibiæ and tarsi with very short, mainly black, stiff pubescence. In ♀, femora black or blackish-brown with yellowish under sides; tips more or less narrowly yellowish; rest of legs as in ♂. *Wings* dull grey, vaguely darker in middle for a distance from anterior margin, also about the tip (in one ♀, wholly pale brownish-grey); alulæ strongly developed; squamæ dirty white, with narrow yellowish margins and a little woolly whitish fringe; halteres brownish-yellow.

Length, 10–13 mm.

Redescribed from two pairs in good condition in the British Museum. Not uncommon in Europe; first obtained in India by Col. Nurse, who bred examples at Deesa, xi. 1899, from pupæ passed by a horse, the imagines emerging about fifteen days later (*Col. Nurse*). Meerut, N.W. India, ♂ ♀; bred from pupæ dropped August 27th (the flies emerging Sept. 13th, 1901) by a Chinese mule of unknown origin, but used in Tientsin Transport Lines by the Chinese Expeditionary Force and shipped to India in July. Several other specimens from the same source were obtained but were destroyed in transit to London (from notes by the donor, *Lt. G. A. Hawks*). The life-history is dealt with by Brauer, Mon. Œstr. pp. 78, 79 (1863). In fresh specimens the dense pubescence is often fox-red, and the thoracic band of black pubescence is often indistinct, especially in the ♀

Genus **PORTSCHINSKIA**, *Semenov*.

Portschinskia, Semenov, Rev. Russe Ent. ii, p. 52 (1902) (nom. nov. for *Microcephalus*, Schnabl, præocc.).
Microcephalus, Schnabl, Deutsche Ent. Zeit. xxi, p. 49 (1877).

Genotype, *Microcephalus loewii*, Schnabl; the original species.

Body robust, entirely without strong bristles. *Head* much narrower than thorax, small; frons rather narrow in ♂, broader

in ♀, flat, with linear (*loewii*) or diverging (*przewalskyi*) sides; three ocelli. Eyes small, bare, facets of uniform size, with a very distinct shining smooth margin round lower half. Antennæ small; 1st joint hardly visible, 2nd bowl-shaped, broader above than below, rather irregular; 3rd joint flatly biconvex, oval heart-shaped, irregularly sinuate in outline; arista thickened basally, rather long, bare, placed on the sunken, lenticular flattened space on the outer side of the 3rd joint (*loewii*), or on the inner side of the outer part of the 3rd joint (*przewalskyi*)*. Face triangular, flat, not projecting beyond base of antennæ; cheeks greatly developed, wrinkled, extending downwards to a distance fully equal to height of eyes, distinctly sunken in middle, projecting a little hindwards on lower part. Mouth-opening small, triangular; proboscis and palpi rudimentary. *Thorax* very thick, well curved, almost broader than long, much narrowed in front; scutellum of medium size, semicircular. *Abdomen* shortly-ovate, as broad as thorax, thick, well curved, 4-segmented (*loewii*) or 5-segmented (*przewalskyi*); genitalia concealed. *Legs* moderately long and strong, hind pair rather longer; all femora thickened at base (*loewii*) or hind pair only (*przewalskyi*); hind tibiæ narrowed at base. *Wings*: 1st longitudinal vein ending a little beyond auxiliary vein; 2nd long, parallel to and rather approximate to 3rd, ending a little before the apex of the latter (which in its turn ends appreciably before the wing-tip), very slightly curved. Anterior cross-vein opposite apex of auxiliary vein (*przewalskyi*) or distinctly beyond it (*loewii*), and at middle of discal cell; 1st posterior cell closed on wing-border (*loewii*) or shortly petiolate, its outer side nearly parallel with the hind margin of the wing; 2nd basal and anal cells subequal, short; 5th vein reaching margin of wing; 6th becoming very weak in its last section but attaining the wing-margin. All the veins distinct except the 6th. Alulæ small, with rounded tips; alar squamæ small, thoracic squamæ much larger, both pairs with a distinct margin, the latter pair distinctly wrinkled.

Range. Central and Southern Europe, Northern and Central Asia, Himalayas.

Life-history unknown.

This genus was established by Schnabl for *Microcephalus loewii*, a new species from the neighbourhood of Jenisseisk, West Siberia, and he noted its affinity to *Hypoderma*. Since the generic name was preoccupied in Reptilia, Coleoptera and Diptera, the genus was renamed by Semenov. Brauer considers the genus † to be related to *Hypoderma*, *Cephalomyia* and *Gastrophilus*. Five species are known.

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* In *P. przewalskyi* the 3rd antennal joint is invaginated at the tip, the arista being placed on the inner side of the outer edge, at about its middle.

† Sitzungsber. Ak. Wiss. Wien, civ, p. 589 (1895).

311. Portschinskia przewalskyi, *Ports.*

Microcephalus przewalskyi, Portschinsky, Horæ Soc. Ent. Ross. xxi, p. 9, pl. i, fig. 7 (1887).

♂ ♀ *Head* much narrower than thorax; upper part of frons nearly linear; at point of nearest approach to the bare, chocolate-brown eyes it is about one-seventh the width of the head, thence widening gradually downwards; frons wholly dull black, with red-brown, rather fine and long pubescence towards sides; ocellar tubercle extending hindwards to extreme vertex, but the

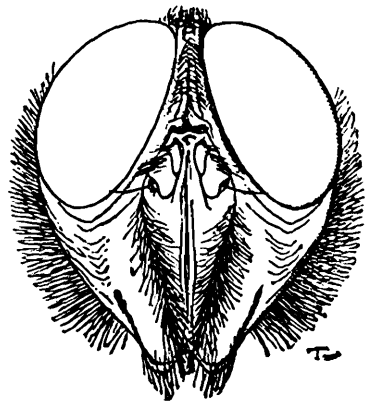

Fig. 84.—*Portschinskia przewalskyi*, Ports., front view of head.

shining brown ocelli are only moderately large, and placed well forward. Face deeply wrinkled, black, receding gradually from base of antennæ; the deeply sunken cheeks, which are sharply demarcated in almost keel-like fashion from the face, reach downwards to a distance equal to more than the height of the eyes, and extend somewhat broadly hindwards; space in the

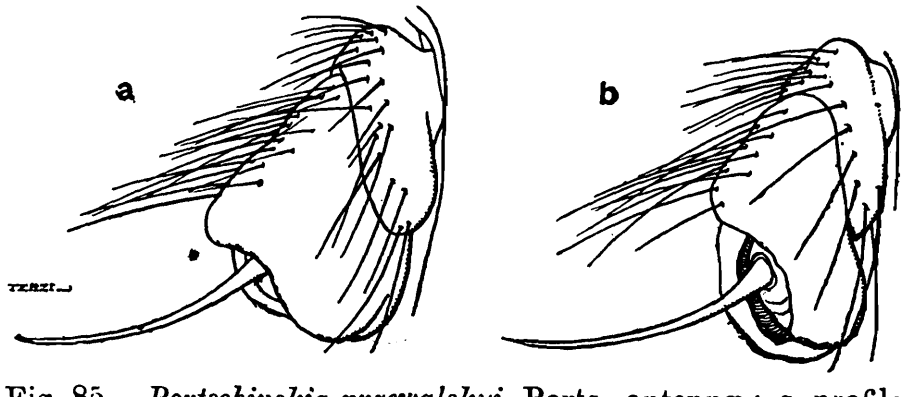

Fig. 85.—*Portschinskia przewalskyi*, Ports., antennæ: *a*, profile, inner side: *b*, half profile.

median line just below antennæ shining black, bare; two conspicuous though narrow and approximate ridges run from below the antennæ nearly to the mouth-opening, and are more or less reddish in colour; hinder part of cheeks with darker, red-brown, rather long and almost shaggy hair; there is a small, slightly wrinkled, shining bare space above the antennæ. The latter dull orange; 1st joint with a few short black and yellowish bristles of

various lengths, 2nd with longer, red-brown or yellowish bristles, 3rd very broad and thick, about twice as high as long, deeply excavated at tip, and on side margins in profile, the red-brown arista being set in this apical cavity. Occiput black, with red-brown pubescence. *Thorax*: ground-colour shining black, wholly covered with long, dense pubescence, which is pale yellowish or brownish on the anterior third, the humeral region, the hind corners broadly, and rather narrowly on the hind margin; and which is black on the remainder of the dorsum. Scutellar pubescence dense, pale yellowish, that of pleuræ mainly similar on mesopleura and sternopleura and dark brown on remainder. *Abdomen* entirely black. In ♂, with dense pubescence, which is yellowish on 1st and 2nd segments and black on 3rd, with a yellowish hind marginal fringe to latter; 4th, 5th and 6th wholly covered with bright orange-red pubescence. In ♀, pubescence black on the whole of 3rd segment, on base and hind margin of 4th and on about middle of 5th, rest of the surface with orange-red pubescence. Venter black; pubescence long and dense mainly black but yellowish at sides of 2nd segment, and orange, red at apex of abdomen. *Legs*: coxæ and femora black, with long, dense, rather ragged hair on under side; fore femora with such hair on hinder side also; tibiæ and tarsi dark brown, with moderately long red-brown pubescence; apices of tarsi black; pulvilli and claws black. *Wings* pale yellowish-grey; whole surface wrinkled; venation in accordance with the generic diagnosis; alar squamæ moderately dark grey with a blackish fringe and a conspicuous dark brown margin; thoracic squamæ paler grey, wrinkled, with a similar margin but no fringe.

Length, 18–21 mm.

Redescribed from two ♂ ♂ and one ♀ in the Indian Museum collection from Andarban, Garhwal District, W. Himalayas, 11,000 ft., vi. 1914 (*Col. Tytler*); also from one ♂ in the British Museum from Sikkim, vii. 1894 (*Col. Bingham*). Originally described from a specimen taken "on the crest of the Burchan Budda" [a mountain range in Koko Nur, North Tibet] "at an absolute elevation of 14,000 ft."

This is the species referred to in my original description of *Criorrhina imitator* as the large *Echinomyia*-like fly which mimics that Syrphid. On being shown to Major Austen, it was immediately recognised by him as the Œstrid *Portschinskia przewalskyi*, Ports. The general resemblance between the *Criorrhina*, the Œstrid and several species of *Bombus* frequenting the Himalayas and adjacent regions, is very striking *.

The generic and specific reference, and the above particulars are gleaned from notes made by Major Austen some years ago in the British Museum collection. He also remarked its resemblance to the species of *Lycastris* (then undescribed) which I have had the pleasure of naming after him (*ante*, p. 279).

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* See note under *Criorrhina imitator*, *ante*, p. 284.

APPENDIX.

Family PIPUNCULIDÆ.

Genus **PIPUNCULUS**, *Latr.* (*ante*, p. 4).

The following four species, described in 1903 from Ceylon by Dr. K. Kertész, were unfortunately overlooked. I have had no opportunity of examining the types or other examples, and the descriptions are therefore translated from the original. Judging by the key at the beginning of Kertész's paper *, it seems that *P. beckeri* has the stigma on the costa of the wing coloured ("Flügelrandmal gefärbt"), and should therefore fall under section 1 of the table on p. 5 of the present volume ("stigma present . "); while the other three species (*æneiventris*, *singalensis* and *angustipennis*) have the stigma "uncoloured" ("Flügelrandmal ungefärbt"), which may mean that they should be placed under section 17 of the table ("stigma entirely absent").

Pipunculus beckeri, *Kert.*

Pipunculus beckeri, Kertész, Ann. Mus. Hung. i, p. 466 (1903).

♂ *Head*: vertical triangle shining black; frons grey-dusted; epistome nearly parallel, very slightly narrowed below, with a silvery-white shimmer. 1st and 2nd antennal joints blackish-brown, 2nd with some microscopic bristly hairs on upper side; 3rd pale brown, pointed below at apex and silvery-white; arista black, the thickened base brown. Occiput grey-dusted. *Thorax* with dorsum slightly shining, black, as is also the scutellum; shoulders yellowish-grey; pleuræ grey; hind margin of dorsum and hinder part of the metanotum, viewed from behind, grey. *Abdomen* black, feebly shining; all the segments grey throughout their length at the sides; 1st segment with grey anterior margin, 2nd segment with a grey dust ring; on the 3rd and 4th segments the grey dust extend from the sides only a little over

* And from the first three of the following descriptions: in the fourth (*P. angustipennis*) nothing is said as to presence or absence of the stigma.

the dorsum, whilst on the 5th segment it is more extended. On the anterior margins of the 3rd, 4th and 5th segments linear impressions, with a small callosity in the middle, are visible; on the 5th there are also two round depressions behind the linear impression. The hypopygium is composed of two unequal pieces asymmetrically placed together; it has neither cleft nor impression, occupies the whole breadth of the abdomen, and has nearly the form of a hemisphere. *Legs*: coxæ, and femora to extreme tips, black; tibiæ on basal fourth and extreme tip blackish-brown; femora and tibiæ grey-dusted; hind femora shining on inner sides; middle femora on apical half of under side armed with small spines; tarsi yellow, the last joints brownish. *Wings* rather brownish; stigma yellowish-brown, about $\frac{1}{4}$ shorter than the 4th costal segment; both together $1\frac{1}{2}$ times as long as the 5th costal segment; anterior cross-vein placed rather before the tip of the auxiliary vein and in the first third of the discal cell. Halteres with stem whitish, clubs brown, dark brown at apex.

Length, 3·6 mm.; wings 3·3 mm.

Two ♂ ♂, Colombo, 28. ii. 1902. *Type* in Hungarian Museum.

Pipunculus æneiventris, *Kert.*

Pipunculus æneiventris, Kertész, Ann. Mus. Hung. i, p. 468 (1903).

♂ *Head*: vertical triangle small, shining black; frons black, with a white shimmer, except on a median longitudinal space; epistome with parallel sides, black, with silvery-white shimmer; antennæ blackish-brown, 2nd and 3rd joints shimmering white; upper side of 2nd joint with only microscopic bristly hairs; 3rd joint beneath with elongated tip; arista black, the thickened base of its 2nd joint elongate; back of head black, with grey dust. *Thorax*: dorsum black, appearing dull from the microscopic grey dust; shoulders brownish-yellow; pleuræ a little shining, with here and there some shimmering white spots; scutellum shining black; metanotum with whitish-grey dust. *Abdomen* metallic dark green, shining, with scattered, black, microscopic pubescence. Hypopygium small, blackish, with sparse grey dust and an elongate cleft on the right side. *Legs*: coxæ black, hind pair shimmering white on outer sides, the other pairs hidden by the rest of the legs; femora black to extreme tips, grey-dusted; hind pair shining on inner side, and furnished with small spines on apical half of under side; tibiæ, except at base and tip, black, uniformly grey-dusted; tarsi yellow, last joint brownish. *Wings* very faintly brownish; costal stigma absent; 3rd costal segment half as long as the 4th, both together shorter by half than the 5th; anterior cross-vein placed rather before tip of 2nd vein, and at middle of discal cell; 3rd vein sinuate at tip. Halteres greyish-yellow.

Length, 3·5 mm.; wings 2·7 mm.

One ♂, Colombo, 25. ii. 1902. *Type* in Hungarian Museum.

Pipunculus singalensis, *Kert.*

Pipunculus singalensis, Kertész, Ann. Mus. Hung. i, p. 469 (1903).

♂. *Head*: vertical triangle black, shining, shimmering silvery-white behind ocellar bump; frons black, bearing silvery-white tomentum, which is absent on a median bare stripe reaching from base of antennæ to about middle of frons, this stripe being pointed at its upper end; epistome with parallel sides, shimmering silvery-white; antennæ brown; 2nd joint microscopically bristly haired, 3rd joint yellow, with tip drawn out beneath; arista black, indistinctly two-jointed, the 2nd joint spindle-shaped and thickened at base; occiput black, with white reflections. *Thorax*: dorsum black, shining, without whitish dust; shoulders brownish-yellow; pleuræ grey-dusted, the sternopleura and metapleura more especially shimmering silvery-white; scutellum shining metallic green; metanotum shining silvery-white. *Abdomen* shining metallic green; 1st segment, also the small hypopygium, with greyish-white dust, the hypopygium with a small oval opening on the right side. *Legs*: coxæ and femora blackish-brown to the extreme apex; middle and hind femora furnished on apical half of under side with microscopic spines; tibiæ on basal fourth and at the extreme tip, blackish-brown; tarsi yellow, with last joint very slightly brownish. *Wings* narrow, barely tinged with brown; stigma absent; 3rd costal segment half as long as 4th; both together half as long as 5th; anterior cross-vein placed opposite the middle of the 4th costal segment, and rather beyond middle of discal cell; 3rd vein slightly sinuate at tip. Halteres yellow.

♀. Frons deep black, shining, slightly wider than lower face, with sides parallel; both frons and lower face shimmering silvery-white; a silvery-white shimmering spot is also present behind the ocellar bump. Antennæ paler and more yellowish. Thoracic dorsum with dust more greyish-brown. Abdominal segments greyish-dusted towards sides; last segment with an impression on front and hind margins as well as at the sides. Hypopygium small, without any furrow, although the last segment has in its middle a shallow furrow which extends nearly to the full breadth of the segment. Ovipositor straight, as long as the hypopygium. In all else as in the ♂.

Length, 2·5 mm.; wings 2·4 mm.

A single pair, Colombo, 28. ii. 1902. *Types* in Hungarian Museum.

Pipunculus angustipennis, *Kert.*

Pipunculus angustipennis, Kertész, Ann. Mus. Hung. i, p. 470 (1903).

♂. *Head*: eyes narrowly separated by the extremely narrow frons, which is shimmering silvery-white on its lower part and shining black on its upper part; lower face with parallel sides, shining black with silvery-white reflections; basal antennal joints

blackish-brown; 2nd joint with very short bristly hairs on upper side; 3rd joint brownish-yellow, with tip somewhat elongate, bowed in front *; arista indistinctly two-jointed, slightly thickened at base; back of head grey-dusted. *Thorax*: dorsum black, dull, grey-brown †; pleuræ grey-dusted; scutellum shining black; metanotum and hind margin of thoracic dorsum with silvery-white reflections. *Abdomen* olive-brown, only the 5th segment black; 1st segment white-dusted, the sides in certain lights with silvery-white reflections. Hypopygium rather large, without furrow. *Legs* yellow; femora, to extreme tips, black; tibiæ with a median dark ring; last tarsal joint brownish; femora and tibiæ whitish-dusted; hind femora shining on inner side. *Wings* rather brownish, very narrow, especially at the base; 3rd costal segment only one-fourth as long as the 4th; both together nearly as long as 5th; anterior cross-vein placed opposite middle of 3rd costal segment, in the first sixth of the discal cell. Halteres yellow.

Length, 2 mm.; wings 2·2 mm.

One ♂, Colombo, 28. ii. 1902. *Type* in Hungarian Museum.

Family SYRPHIDÆ.

Genus **PARAGUS**, *Latr.* (*ante*, p. 30).

The following species has to be added to the Indian Fauna.

Paragus tibialis, *Fln.* ‡

Pipiza tibialis, Fallén, Dipt. Suec., Syrph. p. 60 (1817).
Paragus tibialis, Schiner, Faun. Austr. i, p. 257 (1862); Verrall, Brit. Flies, Syrph. p. 150 (1901).
Paragus politus, Wiedemann, Auss. Zweifl. ii, p. 89 (1828).

♂ *Head*: face yellow, with a black middle line extending from between antennæ to upper mouth-edge, this line being rather widened about its lower part; face shining, produced near its lower part to a distance equal to quite one-third the width of the eye; pubescence whitish, and equal everywhere except on middle line; jowls small, with whitish pubescence, which is continued up the entire back of the head; vertex elongate, shining black, with inconspicuous blackish pubescence; eyes touching for only a small space, with short inconspicuous whitish pubescence, which has no tendency to run into stripes; basal antennal joints black, the rather long 3rd joint brown with a tendency to become yellow beneath; this joint is three times as long as deep; arista quite

* "Mit ziemlich langer, nach vorne gebeugter Spitze."
† Literal translation. Kertész seems to contradict himself here.
‡ For a number of synonyms, see Kertész, Cat. Dipt. vii, p. 7.

bare, brown, about as long as 3rd joint. *Thorax* æneous-black, shining, but slightly obscured by the coarse punctuation, and clothed with fairly abundant, tolerably long and erect, pale yellow pubescence, which is whiter and longer on the pleuræ. Scutellum with no trace of paleness at the tip. *Abdomen* shining blackish, rather coarsely punctate until after the middle; extreme hind margins of segments impunctate and brilliant; basal segment rather long, 2nd longer, 3rd and 4th still slightly longer, 5th much shorter but very obvious. *Legs* bright orange; basal half of anterior, and basal two-thirds of hind femora, black; hind tibiæ usually with a dark ring or blotch just after their middle; hind femora slightly thickened about the middle; basal joint of hind tarsi rather swollen. Pubescence pale and inconspicuous, but a fair ciliation on the posterior tibiæ. *Wings* pellucid; stigma brown or brownish; squamæ and halteres yellow.

♀ similar to ♂, but rather more shining because the pubescence is a little shorter. Face yellow at sides or more frequently only at the extreme sides, and occasionally nearly all obscure or black. Frons bluish-black, rather broad above but gradually narrowing to the face. Scutellum not in the least degree pale at tip.

Length, about 5 mm.

The above description is slightly abridged from that of Verrall, which was drawn up from European, probably mainly British, specimens of both sexes. Col. Yerbury has taken the species at Peradeniya, Ceylon, 1. v. & 29. v. 1892, both ♀♀. A very common, very variable and widely distributed Palæarctic species. Wiedemann's *politus* was described from China. My *indicus* is probably synonymous with *tibialis*.

Genus **MELANOSTOMA**, *Sch.* (*ante*, p. 46).

I have now had an opportunity to see the type of *M. pedium* and that of *M. cothonea*, which is a synonym of *pedium*, and can add the following notes.

Melanostoma pedium, *Walk.* (*ante*, p. 52).

Melanostoma orientale, var., Brunetti, Rec. Ind. Mus. xi, p. 208, pl. xiii, fig. 3 (1915).

The type of *pedium*, Walk. (a ♂), is now quite valueless for purposes of comparison; but that of *cothonea*, Walk. (a ♀), is in good condition, and Major Austen, in revising the British Museum collection of Syrphidæ many years ago, noted that *cothonea* is the ♀ of *pedium*. The form recorded by me from various parts of India as closely allied to, but almost certainly distinct from, *orientale*, Wied., is undoubtedly identical with *pedium*, though only female specimens were obtained. *M. pedium*, then, varies from normal *orientale* structurally in the shape of the face, in which it is intermediate, so far as the prominence of the

two bumps goes, between *orientale* and *univittatum*; in the former the two bumps are quite conspicuous, in the latter the face in profile is reduced to a single wide angle. *M. pedium* varies from *M. orientale* also as follows: by the first pair of abdominal spots being rather larger, oval, and carried well over the sides of the 2nd segment towards the base; by the hind femora being wholly yellow, and the hind tibiæ bearing only an indistinct median dark ring, which is frequently absent.

As there are altogether twelve specimens, all ♀ ♀, there can be no doubt as to the validity of this form. The specimens are in the Indian Museum, from the Simla and Darjiling Districts, the United Provinces, Bengal and Bangalore; Mundali, Dehra Dun District, W Himalayas, 9000 ft., 10–12. v. 1910; Ghumti, Darjiling District, 27. iii. 1910. The species is therefore widely distributed in India and is not uncommon. Walker described both *pedium* and *cothonea* from the "East Indies."

Genus **ASCIA**, *Meig.* (*ante*, p. 105).

Ascia brachystoma, *Wied.* (*ante*, p. 106).

Since the description and remarks on p. 106 were printed, I have seen in the British Museum a ♀ example from Sarawak, which is named with some reservation as this species, but is referred to the genus *Microdon*. The insect in question is probably a *Microdon*, and at the same time it agrees well with Wiedemann's description of *A. brachystoma*. Nevertheless, I hesitate to accept the identification and to transfer the species to *Microdon*, since it is retained under *Ascia* by Kertész (Cat. Dipt. vii), who may have examined the original type, if the latter be still extant. And the resemblance of the British Museum specimen to *A. brachystoma* may be merely superficial.

Genus **ERISTALIS**, *Latr.* (*ante*, p. 155).

The following may be added to the remarks on the life-history of these insects:—A paper by J Fahringer has recently appeared (Zeitschr. wiss. Insektenbiol. xvii, pp. 113–124, 1922) on the parasites and enemies of all the life-stages of *Eristalis tenax* and certain other common European ERISTALINÆ: the list of enemies includes 5 species of plants, among them the fungus *Empusa muscæ*, and 70 species of animals (Protozoa, Arachnids, Myriapods, insects of 5 Orders, fishes, amphibians, reptiles, birds and mammals).

The description of *E. curvipes* on p. 192 was taken from that of Schiner, as the species was then unknown to me. I have since seen specimens from Ceylon, and from these the following redescription is drawn.

Eristalis curvipes, *Sch.* (*ante*, p. 192).

Eristalis curvipes, Schiner, Novara Reise, Dipt. p. 363 (1868).

♂ ♀. *Head*: eyes bearing close yellowish-white pubescence, with a very distinct, broad, longitudinal band of dark brown pubescence in the middle of either eye (as in *E. tenax*); unicolorous, contiguous for some distance in ♂; vertical triangle with black hairs in ocellar region and yellowish hairs elsewhere; frons very prominent, shining black, with long black pubescence, its anterior margin orange; antennæ mainly blackish, but 3rd joint sometimes dull brownish-orange; arista brown, shortly plumose above and below on about basal half; whole head from below antennæ strongly produced diagonally downwards and forwards, as an irregularly shaped, obtusely tipped cone; shining black, with an indistinct brownish-yellow stripe on either side, and with rather long, shaggy, yellowish hair at base and extending for some distance along sides; back of head dark grey with yellowish pubescence; lower occipital margin narrowly silvery-white, with whitish hair on lower part of head. In ♀, frons and face gradually widening from above downwards, the yellow side stripes on the latter broader. *Thorax* blackish with yellowish-grey pubescence, the ends of the suture faintly greyish; pleuræ blackish, with more yellowish pubescence; scutellum brownish-orange with fine black pubescence on disc and a fringe of yellow hairs on margin. *Abdomen*: 1st segment pale grey with yellow pubescence; remainder black; 2nd segment with a pair of elongate, nearly linear, brownish-orange spots, transversely placed across middle of segment, a little narrowed at inner ends, which nearly meet, and broader at outer ends on side margins; 3rd segment with similar but much narrower spots, which do not approach side margins; 4th segment with a still smaller replica of similar spots; hind margins of 2nd, 3rd and 4th segments narrowly orange; pubescence mainly pale yellow, but the black parts generally with some proportion of black pubescence; last segment wholly black-haired. Venter black, more or less shining, generally yellowish in region of 2nd segment, wholly with pale yellow or whitish pubescence. *Legs* with femora only slightly thickened; hind tibiæ in ♂ conspicuously bent just beyond middle; legs black, knees very narrowly pale; middle tibiæ pale on about basal half, especially in ♀; hind tibiæ at base and on a rather narrow, ill-defined, median ring, pale orange or brownish; pubescence of legs mainly yellowish, but there is a considerable proportion of black on the hind tibiæ, especially in ♂. *Wings* pale yellowish-grey, darker and more brownish-yellow anteriorly; stigma small but distinct; halteres brownish-orange.

Length, 10–13 mm.

Redescribed from one ♂ and several ♀ ♀ in the British Museum from Ceylon: Nuwara Eliya, 6–15. v. 1891; Hakgala, 24. v. 1891 (all specimens taken by *Col. Yerbury*). The examples are in

indifferent condition, but undoubtedly belong to this species. Three conspicuous characters combine to make this species easily recognisable : the brown band of pubescence on the eyes, the extremely strongly produced, snout-like lower part of the head and the strikingly bent hind tibiæ. This latter character is less noticeable in the ♀, but the other two characters are equally pronounced in both sexes.

The following additional records of localities and other remarks have come to hand too late for inclusion in the Appendix in proper systematic order. All the records relating to Ceylon in the following list are from manuscript notes by Colonel Yerbury, or from specimens collected there by him and now in the British Museum.

Paragus serratus, *Fabr.* (*ante*, p. 31). Add to localities : generally common in Ceylon ; recorded for the months i–iii, vii, viii, x–xii.

Paragus rufiventris, *Brun.* (*ante*, p. 34). Add to localities : Peradeniya, 29. v. 1892 ; Kandy, 29. vi. 1892.

Paragus tibialis, *Fallén* (*ante*, p. 409). After "Peradeniya, etc.," add "by sweeping, uncommon."

Melanostoma univittatum, *Wied.* (*ante*, p. 50). Add : Ceylon ; Pankullam, 1. i. 1891 ; Mahintalli, 28. xii. 1890 ; Trincomalee, Hot Wells, 4. ii. 1892 ; fairly common round Trincomalee.

Syrphus serarius, *Wied.* (*ante*, p. 73). Add : Hakgala, 4. v. 1891 ; Huldamulla, 9. vi. 1892 ; Nuwara Eliya, 5. v. 1891, 11. vii. 1892 ; Horton Plains, 20. v. 1891 (all Ceylon).

Syrphus balteatus, *De Geer* (*ante*, p. 82). Add : generally distributed in Ceylon ; ii, v, vi, vii, xi, xii.

Syrphus cinctellus, *Zett.*, or a species near it (*ante*, p. 84). Add : fairly common round Nuwara Eliya, Ceylon.

Ischiodon scutellaris, *Fabr.* (*ante*, p. 97). Add : common in various localities in Ceylon ; "always taken in sweeping marshy places, never seen on the wing" (*Yerbury*). I have taken the species freely at times in India, always resting on flowers or leaves, and I cannot remember ever having taken it flying, though the fact had not previously occurred to me as unusual.

Sphærophoria javana, *Wied.* (*ante*, p. 100). Add : Haragama, 1. vi. 1892 ; Perivipancheram, 21. i. 1892 ; Kanthalai, 31. i. 1891 (all Ceylon).

Baccha nubilipennis, *Aust.* (*ante*, p. 116). Add : "Not uncommon in Central Province, Ceylon, hovering in the shade" (*Yerbury*).

Baccha fallax, *Aust.* (*ante*, p. 117). Add : rare in Ceylon ; Haycock Hill, 24. iv. 1892 ; Kandy, 30. v. 1892.

Baccha sapphirina, *Wied.* (*ante*, p. 122). Add: rare in Ceylon; occurs round Trincomalee.

Baccha triangulifera, *Aust.* (*ante*, p. 124). Add: Huldamulla, Ceylon, 10. vi. 1892.

Baccha amphithoe, *Walk.* (*ante*, p. 126). Add: uncommon in Ceylon.

Rhingia binotata, *Brun.* (*ante*, p. 131). Sack describes a ♀ from Formosa (Arch. Naturg., Abt. A, 1921, p. 266).

Graptomyza brevirostris, *Wied.* (*ante*, p. 138). Add: Henerat-goda, 7 ii. 1892; Kandy, 28. vi. 1892 (both Ceylon).

Eristalis niger, *Wied.* (*ante*, p. 163). Add: Peradeniya, Ceylon, 17 v. 1892.

Eristalis simulatus, sp. n. (*ante*, p. 177). This species may possibly be synonymous with *cerealis*, Fabr.

Eristalis obscuritarsis, *de Meij.* (*ante*, p. 190). Add: Ceylon, various localities; iii, ix, x, xii. Sack records this species from Formosa.

Eristalis multifarius, *Walk.* (*ante*, p. 194). Add: not uncommon in Ceylon; Peradeniya, 28. iv. 1891, 22 and 29. v. 1892; Andankullam, 30. xii. 1890; Anuradhapura, 30. xii. 1890.

Megaspis crassus, *Fabr.* (*ante*, p. 197). Add: rare in Ceylon; Baddegama, 2. v. 1892.

Megaspis errans, *Fabr.* (*ante*, p. 199). To the list of synonyms add: *Eristalis plistoanax*, Walker, List Dipt. Brit. Mus. iii, p. 628 (1849), *teste* Major Austen, in MS. note. *E. plistoanax* was described from the Philippines. To the localities add: very common in various places in Ceylon.

Megaspis zonatus, *Fabr.* (*ante*, p. 203). Add: only one example was seen in Ceylon by Colonel Yerbury.

Helophilus curvigaster, *Macq.*, 1842 (*ante*, p. 206). This species proves to be synonymous with *Merodon interveniens*, Walk., 1860 (*ante*, p. 212). Macquart's name has priority.

Helophilus bengalensis, *Wied.* (*ante*, p. 209). Add: Ceylon, very common; Trincomalee, Kanthalai, and other places, i and viii–x.

Helophilus quadrivittatus, *Wied.* (*ante*, p. 210). Add: Kan-thalia, 12. viii. 1891; Peradeniya, 30. iv. 1891 (both Ceylon).

Merodon interveniens, *Walk.* (*ante*, p. 212). This proves to be synonymous with *Helophilus curvigaster*, Macq., and the name *curvigaster* is older than *interveniens*, as stated a few lines above. A further synonym is: *Teuchomerus orientalis* (Brunetti), Sack, Arch. Naturg. 1921, Abt. A, p. 266. Sack makes *orientalis*, Brun., the type of his genus *Teuchomerus*. Possibly the African *Eristalis vilis*, Wied., and *Eristalis crassipes*,

Fabr., are also synonyms. The species is undoubtedly a *Merodon*. To the localities add: rare in Ceylon; Trincomalee, Hot Wells, 6. ix. 1891.

Genus **KORINCHIA**: since the remarks on pages 224–6 were printed, Mons. Hervé-Bazin has described yet another species, *K. aurata*, sp. nov., from Java, in Bull. Soc. ent. France, no. 15, p. 213, 1922.

Xylota carbonaria, *Brun.* (*ante*, p. 240). Add: Kandy, 18. v. 1892; Heneratgoda, 7 ii. 1892; Haycock Hill, 27 iv. 1892 (all Ceylon).

Syritta orientalis, *Macq.* (*ante*, p. 246). Add: Trincomalee; Heneratgoda; Perivipancheram, 9. iii. 1892 (all Ceylon).

Eumerus aurifrons, *Wied.* (*ante*, p. 252). Add: uncommon in Ceylon.

Eumerus (?) **argentipes**, *Walk.* A form which is either this species, or very close to it, is "rare in Ceylon" (*Yerbury*). I have not been able to decide the status of this form, and have therefore omitted it from the text of this volume. The genus requires thorough revision on abundant and fresh material. *E. argentipes*, Walk., is recorded (Kertész, Cat. Dipt. vii, p. 313, 1910) from Batchian, Amboina, and New Guinea.

Microdon ruficaudus, *Brun.* (*ante*, p. 317) and **M. auricinctus**, *Brun.* (*ante*, p. 318). The records of these species from Formosa were published by Sack, Arch. Naturg. 1921, Abt. A, p. 266.

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All names printed in italics are synonyms. When more than one reference is given, a page indicated by thickened numerals is that on which a description of the species occurs.

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EXPLANATION OF PLATE I.

PIPUNCULIDÆ, SYRPHIDÆ.

Fig. 1. *Pipunculus major*, sp. nov., antenna; p. 10.
2. „ *subæneus*, sp. nov., antenna; p. 12.
3. „ *transversus*, sp. nov., antenna; p. 13.
4. „ *chalybeus*, sp. nov., antenna; p. 15.
5. „ *uniformis*, Brun., antenna; p. 14.
6. *Paragus serratus*, F., head in profile; p. 31.
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9. *Pipizella rufiventris*, Brun., head in profile; p. 37.
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13. „ *albimanus*, F., front leg, ♂; p. 54.
14. *Melanostoma orientale*, Wied., abdomen, ♂; p. 48.
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19. *Syrphus balteatus*, De Geer, abdomen (typical); p. 82.
20. „ „ var. *alternans*, abdomen.
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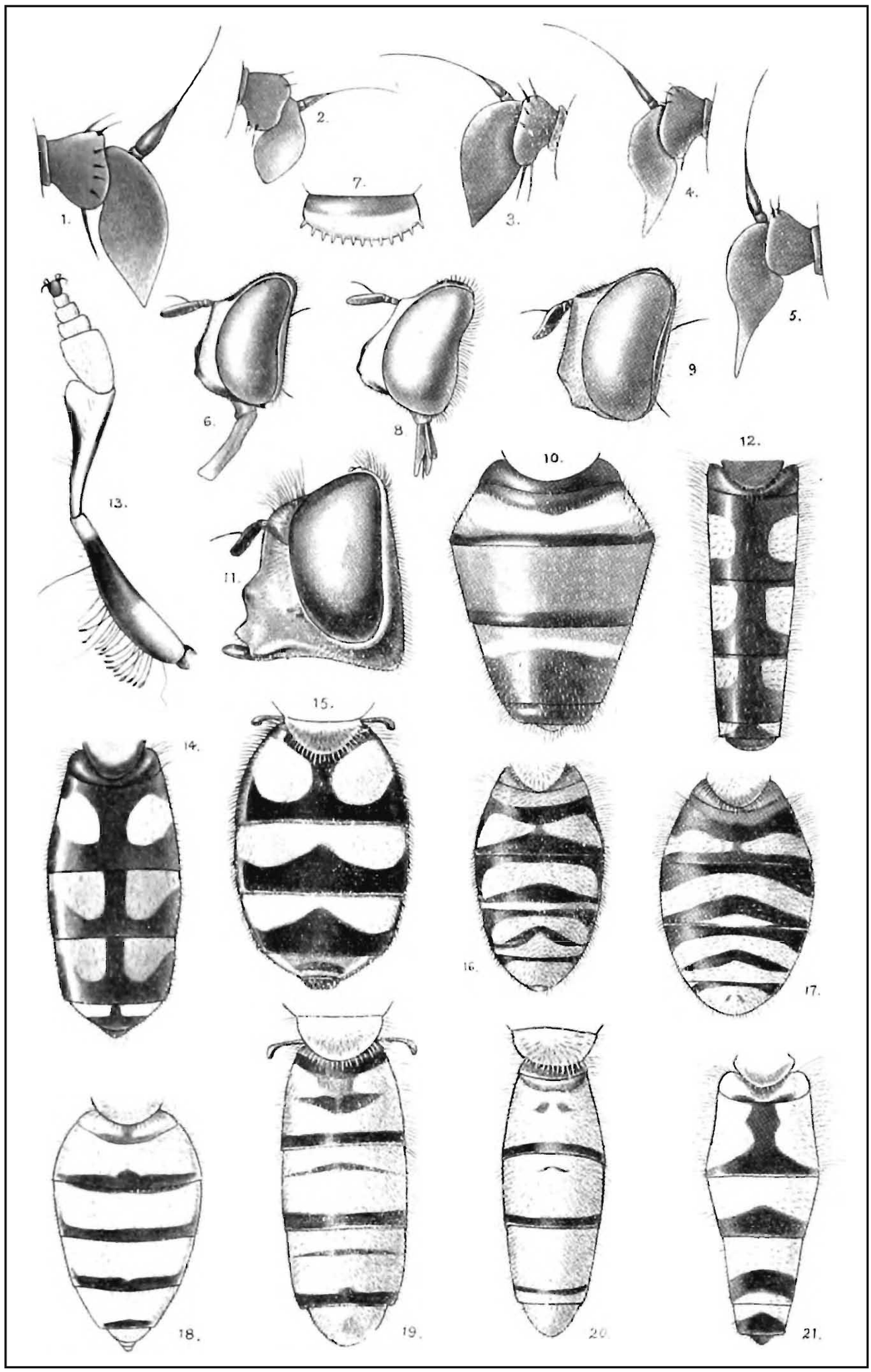

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INDIAN PIPUNCULIDÆ AND SYRPHIDÆ.

EXPLANATION OF PLATE II.

Syrphidæ.

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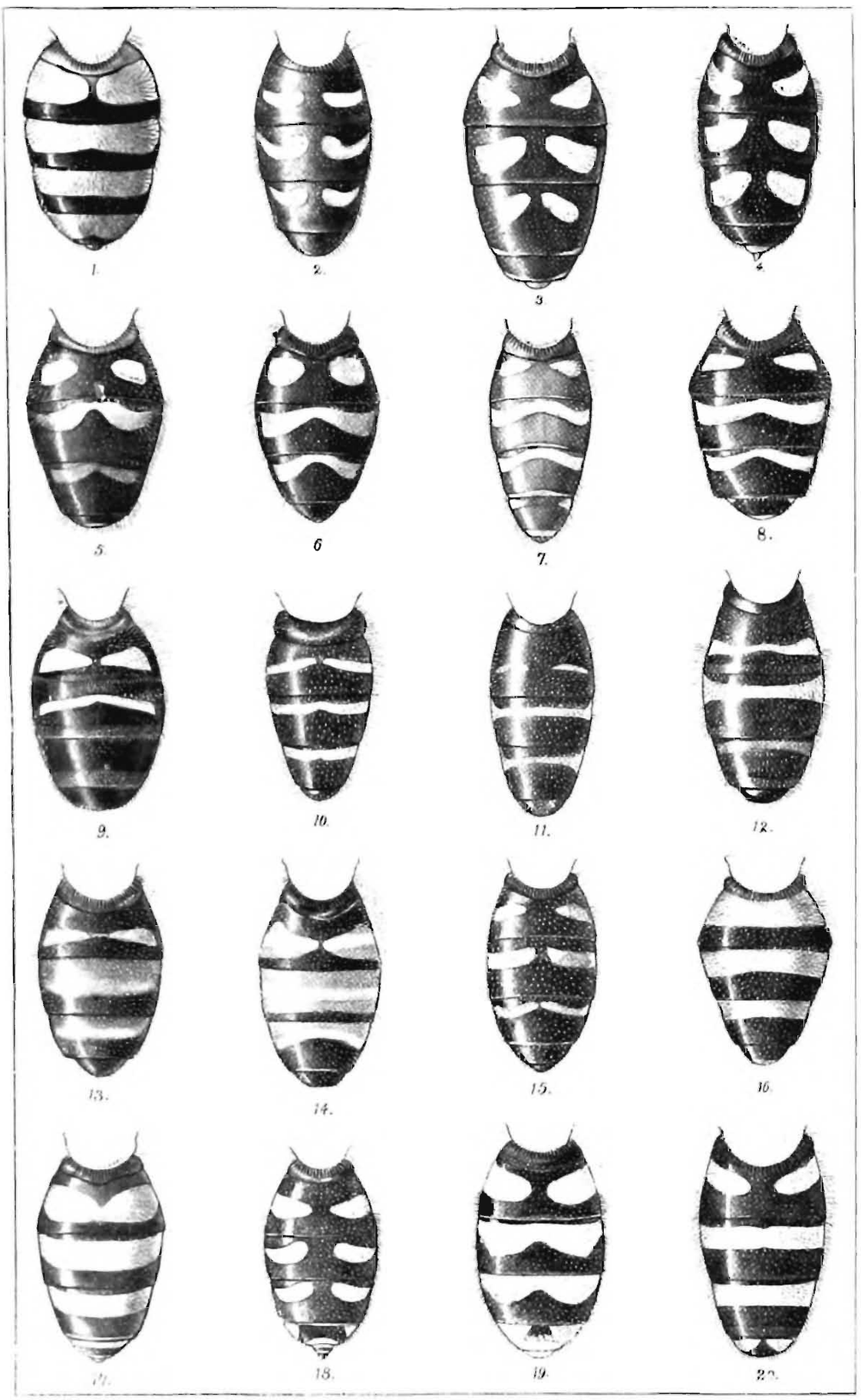
19. „ *latifasciatus*, Macq., abdomen, ♀; p. 87.
20. *Xanthogramma citrinum*, sp. nov., abdomen, ♂; p. 95.



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INDIAN SYRPHIDÆ

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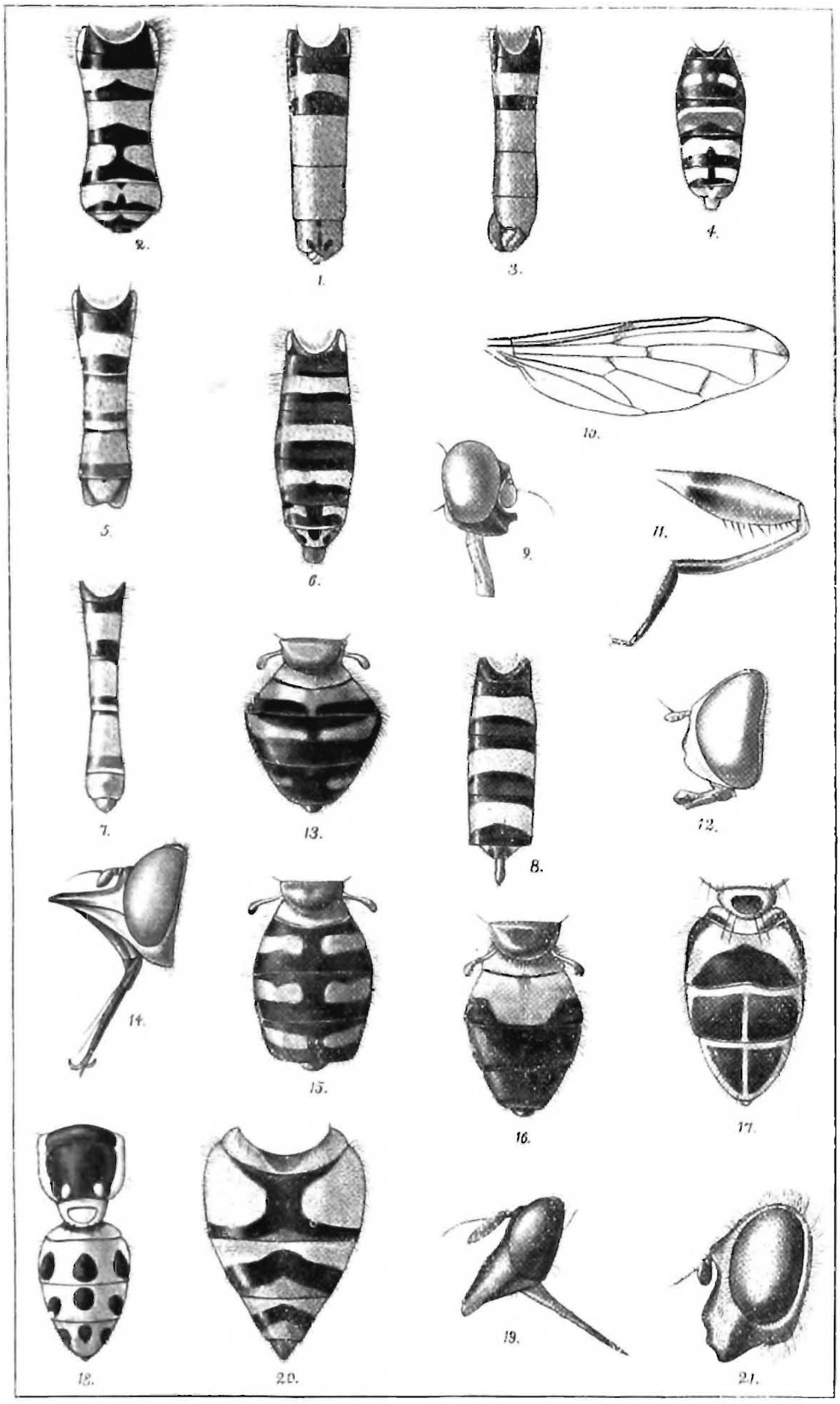

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INDIAN SYRPHIDÆ.

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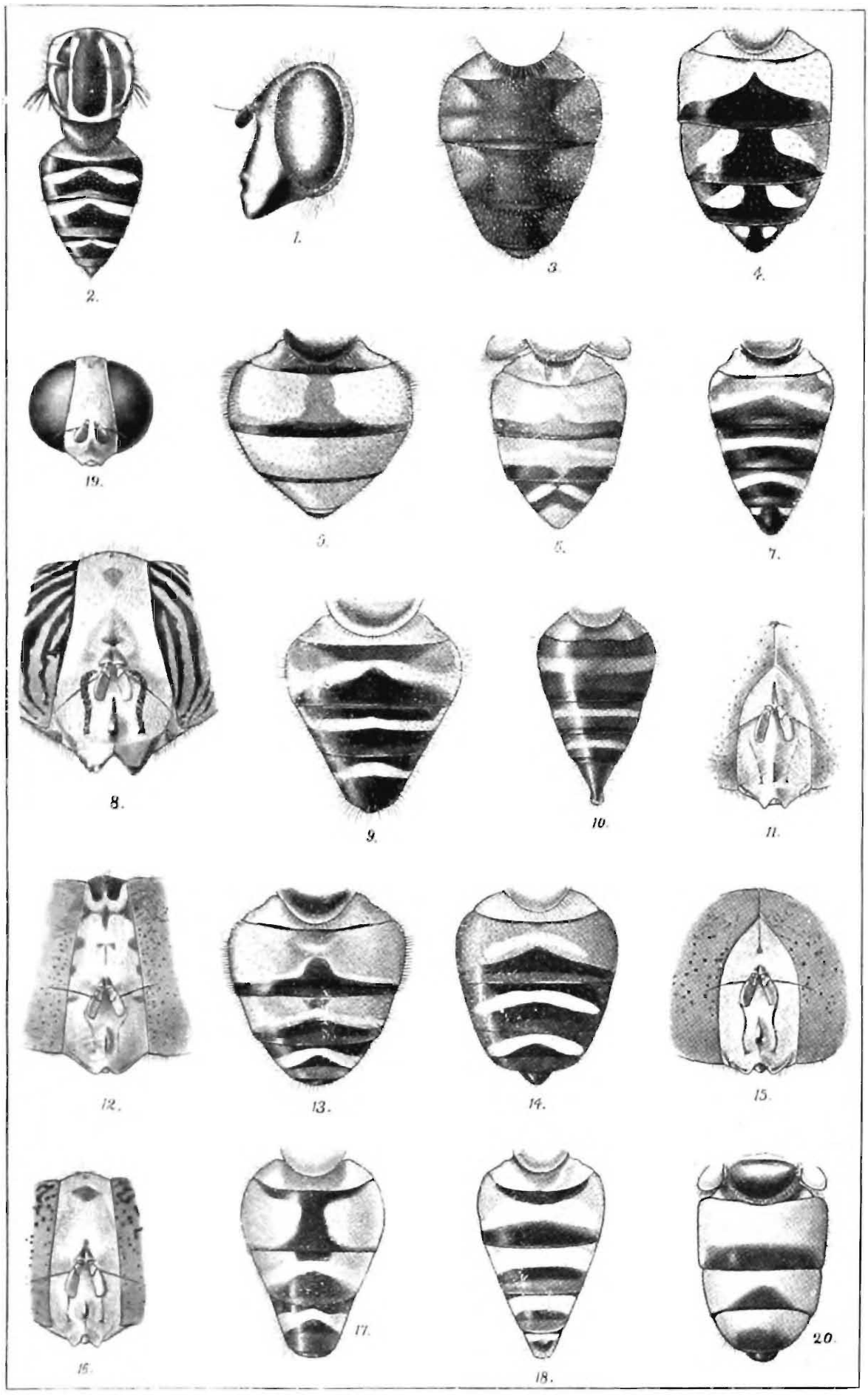

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INDIAN SYRPHIDÆ.

EXPLANATION OF PLATE V.

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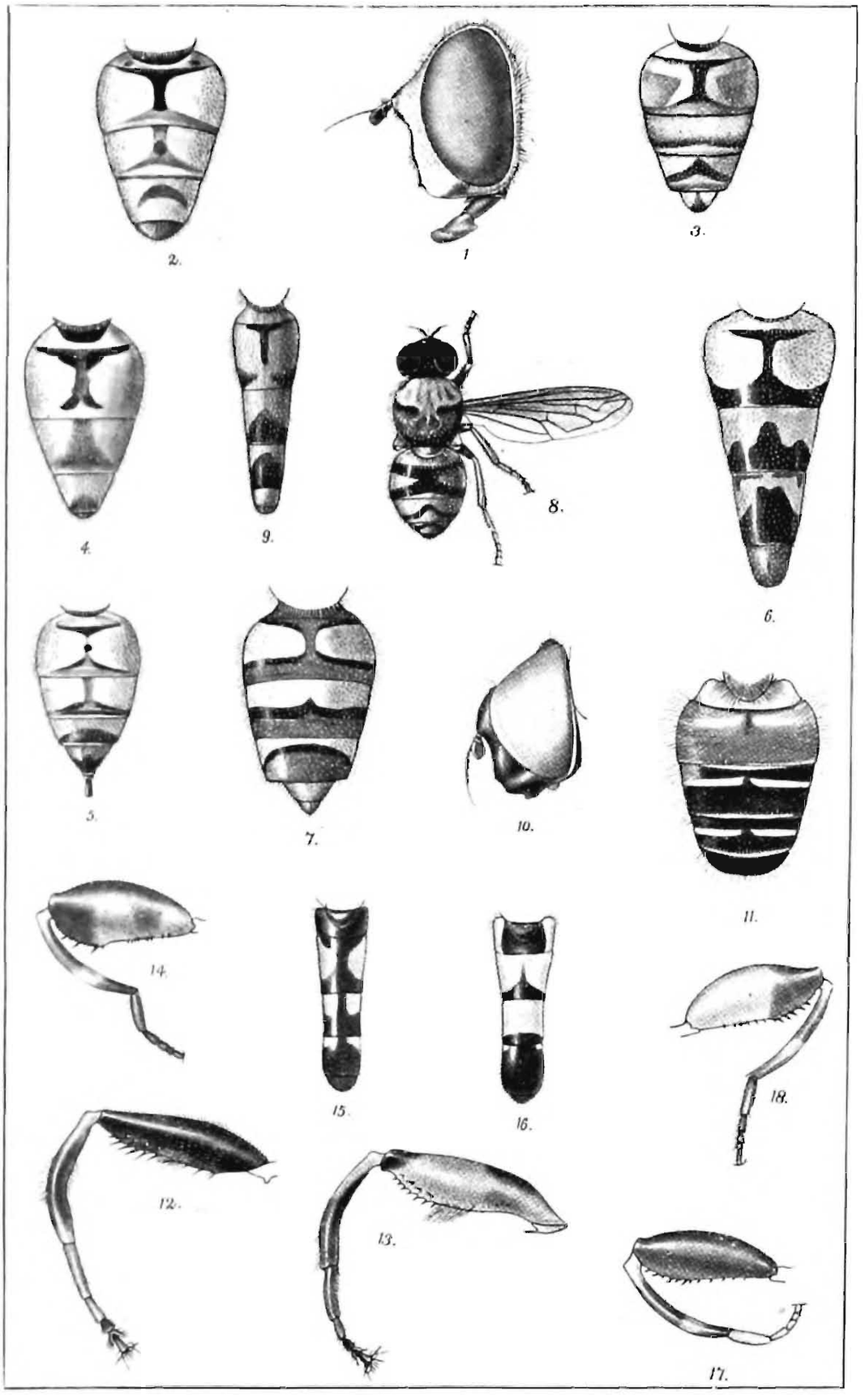
12. *Xylota auronitens*, Brun., hind leg, ♂; p. 239.
13. „ *bistriata*, Brun., hind leg, ♂; p. 238.
14. *Syritta pipiens*, L., hind leg, ♂ (European specimen); [p. 245.
15. „ „ abdomen (Indian specimen).
16. „ *orientalis*, Macq., abdomen, ♂; p. 246.
17. „ „ hind leg, ♂.
18. „ *rufifacies*, Big., hind leg, ♂; p. 247.



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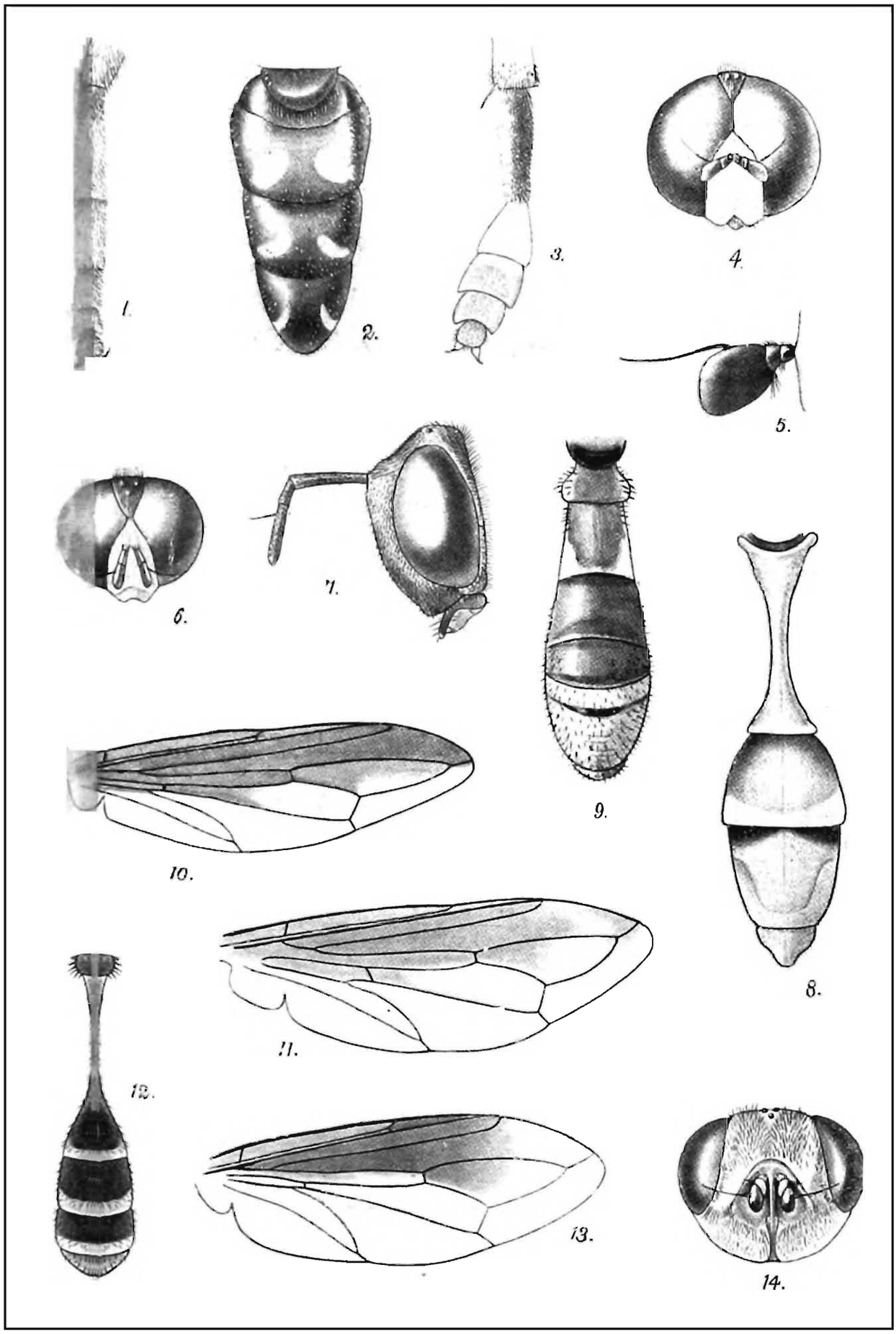
EXPLANATION OF PLATE VI.

Syrphidæ, Conopidæ, Œstridæ.

Fig. 1. *Eumerus nicobarensis*, Sch., hind tarsus, ♂; p. 251.
2. „ *aurifrons*, Wied., abdomen: p. 252.
3. „ „ hind tarsus, ♂.
4. „ *albifrons*, Walk., front view of head, ♂; [p. 257.
5. „ *halictoides*, Brun., antenna; p. 258.
6. „ *pulverulentus*, Brun., front view of head, ♂; [p. 258.
7. *Microdon annandalei*, Brun., head in profile; p. 316.
8. *Ceria eumenioides*, Saund., abdomen; p. 337.
9. *Conops nubeculosus*, Big., abdomen; p. 350.
10. *Physocephala bicolor*, sp. nov., wing; p. 357.
11. „ *rufescens*, sp. nov., wing; p. 360.
12. „ *calopus*, Big., abdomen; p. 364.
13. „ „ wing.
14. *Gastrophilus equi*, Clark, front view of head; p. 396.



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